OPERATION MANUAL

MULTIQUIP

WHITEMAN SERIES

MODEL HHN-34TVDTCSL4

MODEL HHN-34TVDTCSL5

RIDE ON TROWEL

(VANGUARD DIESEL ENGINE)

Revision #1 (05/08/06)

To find the latest revision of this publication, visit our website at: www.multiquip.com

THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.

P/N 21729

WARNING

CALIFORNIA — Proposition 65 Warning

Engine exhaust and some of its constituents, and some dust created by power sanding, sawing, grinding, drilling and other construction activities contains chemicals known to the State of California to cause cancer, birth defects and other reproductive harm. Some examples of these chemicals are:

- Lead from lead-based paints.
- Crystalline silica from bricks.
- Cement and other masonry products.
- Arsenic and chromium from chemically treated lumber.

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: ALWAYS work in a well ventilated area, and work with approved safety equipment, such as dust masks that are specially designed to filter out microscopic particles.

WARNING

SILICOSIS WARNING

Grinding/cutting/drilling of masonry, concrete, metal and other materials with silica in their composition may give off dust or mists containing crystalline silica. Silica is a basic component of sand, quartz, brick clay, granite and numerous other minerals and rocks. Repeated and/or substantial inhalation of airborne crystalline silica can cause serious or fatal respiratory diseases, including silicosis. In addition, California and some other authorities have listed respirable crystalline silica as a substance known to cause cancer. When cutting such materials, always follow the respiratory precautions mentioned above.

WARNING

RESPIRATORY HAZARDS

Grinding/cutting/drilling of masonry, concrete, metal and other materials can generate dust, mists and fumes containing chemicals known to cause serious or fatal injury or illness, such as respiratory disease, cancer, birth defects or other reproductive harm. If you are unfamiliar with the risks associated with the particular process and/or material being cut or the composition of the tool being used, review the material safety data sheet and/or consult your employer, the material manufacturer/supplier, governmental agencies such as OSHA and NIOSH and other sources on hazardous materials. California and some other authorities, for instance, have published lists of substances known to cause cancer, reproductive toxicity, or other harmful effects.

Control dust, mist and fumes at the source where possible. In this regard use good work practices and follow the recommendations of the manufacturers or suppliers, OSHA/NIOSH, and occupational and trade associations. Water should be used for dust suppression when wet cutting is feasible. When the hazards from inhalation of dust, mists and fumes cannot be eliminated, the operator and any bystanders should always wear a respirator approved by NIOSH/MSHA for the materials being used.

NOTE PAGE

HERE'S HOW TO GET HELP

PLEASE HAVE THE MODEL AND SERIAL NUMBER *ON-HAND* WHEN PLACING ORDER

UNITED STATES

Multiquip Corporate Office
18910 Wilmington Ave. Tel. (800) 421-1244
Carson, CA 90746 Fax (800) 537-3927
Contact: mq@multiquip.com

Mayco Parts
800-306-2926 Fax: 800-672-7877
310-537-3700 Fax: 310-637-3284

Service Department
800-421-1244 Fax: 310-537-4259
310-537-3700

MQ Parts Department
800-427-1244 Fax: 800-672-7877
310-537-3700 Fax: 310-637-3284

Warranty Department
800-421-1244, Ext. 279 Fax: 310-537-1173
310-537-3700, Ext. 279

Technial Assistance
800-478-1244 Fax: 310-631-5032

MEXICO

MQ Cipsa
Carr. Fed. Mexico-Puebla KM 126.5 Tel. (52) 222-225-9900
Momoxpan, Cholula, Puebla 72760 Mexico Fax (52) 222-285-0420
Contact: pmastretta@cipsa.com.mx

CANADA

Multiquip
4110 Industriel Boul. Tel. (450) 625-2244
Laval, Quebec, Canada H7L 6V3 Fax (450) 625-8664
Contact: jmartin@multiquip.com

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This manual MUST accompany the equipment at all times. This manual is considered a permanent part of the equipment and should remain with the unit if resold.

The information and specifications included in this publication were in effect at the time of approval for printing. Illustrations are based on the *MQ Whiteman Series HHN-34TVD Ride-On Power Trowel.* Illustrations, descriptions, references and technical data contained in this manual are for guidance only and may not be considered as binding. Multiquip Inc. reserves the right to discontinue or change specifications, design or the information published in this publication at any time without notice and without incurring any obligations.

Your Local Dealer is:

MULTIQUIP INC.
18910 WILMINGTON AVE.
CARSON, CALIFORNIA 90746
800-421-1244 • 310-537-3700
FAX: 310-537-3927
E-mail:mq@multiquip.com
Internet:multiquip.com

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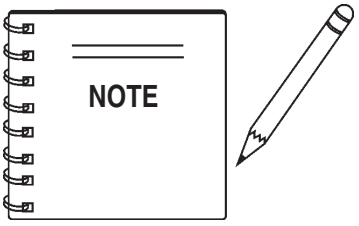


Specifications and part numbers are subject to change without notice.

www.multiquip.com

Ordering parts has never been easier!
Choose from three easy options:

Best Deal!

Order via Internet (Dealers Only):
Order parts on-line using Multiquip's SmartEquip website!

- View Parts Diagrams
- Order Parts
- Print Specification Information

Goto www.multiquip.com and click on Order Parts to log in and save!

If you have an MQ Account, to obtain a Username and Password, E-mail us at: **parts@multiquip.com.**

To obtain an MQ Account, contact your District Sales Manager for more information.

Use the ***internet*** and qualify for a **5% Discount** on *Standard orders* for all orders which include complete part numbers.*

Note: Discounts Are Subject To Change

Order via Fax (Dealers Only):
All customers are welcome to order parts via Fax.
Domestic (US) Customers dial:
1-800-6-PARTS-7 (800-672-7877)

Fax your order in and qualify for a **3% Discount** on *Standard orders* for all orders which include complete part numbers.*

Note: Discounts Are Subject To Change

Order via Phone: **Domestic (US) Dealers Call:**
1-800-427-1244

Non-Dealer Customers:
Contact your local Multiquip Dealer for parts or call 800-427-1244 for help in locating a dealer near you.

International Customers should contact their local Multiquip Representatives for Parts Ordering information.

When ordering parts, please supply:

- ❒ **Dealer Account Number**
- ❒ **Dealer Name and Address**
- ❒ **Shipping Address (if different than billing address)**
- ❒ **Return Fax Number**
- ❒ **Applicable Model Number**
- ❒ **Quantity, Part Number and Description of Each Part**
- ❒ **Specify Preferred Method of Shipment:**
  - ✓ Fed Ex/UPS
    - Priority One
    - Ground
    - Next Day
    - Second/Third Day
  - ✓ DHL
  - ✓ Truck

NOTE

Unless otherwise indicated by customer, all orders are treated as *Standard Orders* and will ship within 24 hours. We will make every effort to ship *Air Shipments* the same day the order is received, if received prior to 2PM PST. *Stock Orders* must be noted on fax or web order form.

WE ACCEPT ALL MAJOR CREDIT CARDS!

MULTIQUIP

TRAINING CHECKLIST

This checklist lists some of the minimum requirements for machine operation. Please feel free to make copies for daily use. Use this checklist when training a new operator or use as a review for more experienced operators.

TRAINING CHECKLIST			
NO.	**DESCRIPTION**	**OK?**	**DATE**
1	Read Operator's Manual completely.		
2	Machine layout, location of components, checking of engine and fluid levels.		
3	Fuel system, refueling procedure.		
4	Operation of spray and lights.		
5	Operation of controls (machine not running).		
6	Safety controls, Safety Stop Switch operation.		
7	Emergency stop procedures.		
8	Startup of machine.		
9	Maintaining a hover.		
10	Maneuvering.		
11	Pitching.		
12	Matching blade pitch between towers Twin Pitch™, disengaging the linkage.		
13	Concrete finishing techniques.		
14	Shutdown of machine.		
15	Lifting of machine (lift loops).		
16	Machine transport and storage.		

Operator _____ Trainee _____

COMMENTS:

DAILY PRE-OPERATION CHECKLIST

DAILY PRE-OPERATION CHECKLIST

DAILY PRE-OPERATION CHECKLIST		✓	✓	✓	✓	✓	✓
1	Engine Oil Level.						
2	Gearbox Fluid Level.						
3	Radiator Coolant Level.						
4	Condition of Blades.						
5	Blade Pitch Operation.						
6	Safety-Stop Switch Operation.						
7	Steering Control Operation.						
8	Condition of Belts.						

COMMENTS:

HHN-34TVD — SAFETY MESSAGE ALERT SYMBOLS

FOR YOUR SAFETY AND THE SAFETY OF OTHERS!

Safety precautions should be followed at all times when operating this equipment. Failure to read, understand and comply with the Safety Messages and Operating Instructions could result in injury to yourself and others.

This Operation Manual has been developed to provide instructions for the safe and efficient operation of the HHN - 34TVD Ride-On Trowel. For engine maintenance information, please refer to the engine manufacturer's instructions for data relative to its safe operation.

Before using this Ride-On Trowel, ensure that the operating individual has read, understands, and complies with all instructions in this manual.

SAFETY MESSAGE ALERT SYMBOLS

The three (3) Safety Messages shown below will inform you about potential hazards that could injure you or others. The Safety Messages specifically address the level of exposure to the operator, and are preceded by one of three words: **DANGER**, **WARNING**, or **CAUTION**.

DANGER

You **WILL** be ***KILLED*** or ***SERIOUSLY INJURED*** if you **DO NOT** follow these directions.

WARNING

You **CAN** be **KILLED** or ***SERIOUSLY INJURED*** if you **DO NOT** follow these directions.

CAUTION

You **CAN** be ***INJURED*** if you **DO NOT** follow these directions.

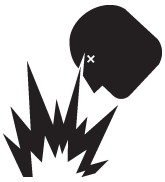
Potential hazards associated with trowel operation will be referenced with Hazard Symbols which appear throughout this manual, and will be referenced in conjunction with Safety Message Alert Symbols.

HAZARD SYMBOLS

Lethal Exhaust Gases

Engine exhaust gases contain harmful toxins and will displace oxygen when running in an enclosed or confined space. **NEVER** operate this equipment in a confined area or enclosed structure that does not provide ample free flow air.

Explosive Fuel



Engine fuel is flammable, and its vapors can cause an explosion if ignited. **DO NOT** start the engine near spilled fuel or combustible fluids. **DO NOT** fill the fuel tank while the engine is running or hot. **DO NOT** overfill tank, since spilled fuel could ignite if it comes into contact with hot engine parts or sparks from the ignition system. Store fuel in approved containers, in well-ventilated areas and away from sparks and flames. **NEVER** use fuel as a cleaning agent.

Burn Hazards

Engine components can generate extreme heat. To prevent burns, **DO NOT** touch these areas while the engine is running or immediately after operations. **NEVER** operate the engine with heat shields or heat guards removed.

Rotating Parts

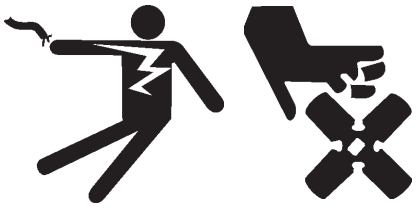
NEVER operate equipment with covers or guards removed. Keep ***fingers***, ***hands***, ***hair*** and ***clothing*** away from all moving parts to prevent injury.

Skin Injection Hazard

NEVER use your hand to find hydraulic leaks. Use a piece of wood or cardboard. Hydraulic fluid injected into the skin must be treated by a knowledgable physician immediately or severe injury or death can occur.

HHN-34TVD — SAFETY MESSAGE ALERT SYMBOLS

Accidental Starting



Accidental starts can cause severe injury or death.

ALWAYS place the ON/OFF switch in the OFF position. Disconnect and ground spark plug lead and disconnect negative battery cable from battery before servicing.

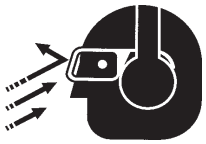
Over Speed Conditions

NEVER tamper with the factory settings of the engine governor or settings. Personal injury and damage to the engine or equipment can result if operating in speed ranges above maximum allowable.

Respiratory Hazard

ALWAYS wear approved respiratory protection.

Sight and Hearing hazard



ALWAYS wear approved eye and hearing protection.

Equipment Damage Messages

Other important messages are provided throughout this manual to help prevent damage to your trowel, other property, or the surrounding environment.

CAUTION

This Ride-On Trowel, other property, or the surrounding environment could be damaged if you do not follow instructions.

RULES FOR SAFE OPERATION

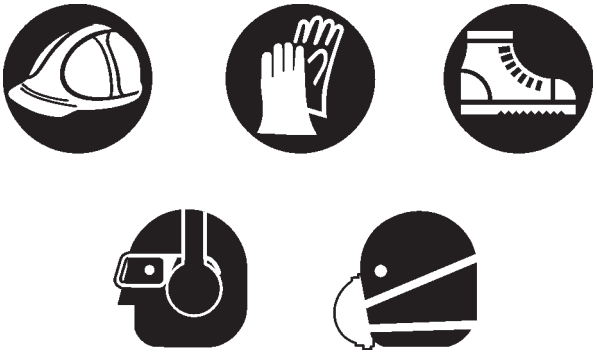
⚠ WARNING

Failure to follow instructions in this manual may lead to serious injury or even death! This equipment is to be operated by trained and qualified personnel only! This equipment is for industrial use only.

The following safety guidelines should always be used when operating the HHN-34TVD Ride-On Trowel.

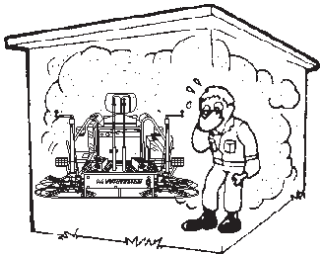
SAFETY

- **DO NOT** operate or service this equipment before you read, understand, and comply with all safety messages in this manual. The manual must be kept available and accessible to the operator.
- This equipment should not be operated by persons under the minimum statutory age limit.
- **NEVER** use this machine for any purpose other than those described in this manual.
- **NEVER** operate the trowel without proper protective clothing, shatterproof glasses, steel-toed boots and other protective devices required for the job.

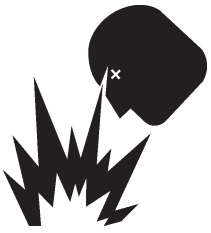


- **NEVER** use accessories or attachments which are not recommended by Multiquip for this equipment. Damage to the equipment and/or injury to user may result.
- Manufacturer does not assume responsibility for any accident due to equipment modifications. Unauthorized equipment modification will void all warranties. Any modification which could lead to a change in the original characteristics of the machine should be made only by the manufacturer who shall confirm that the machine is in conformity with appropriate safety regulations.
- **NEVER** operate this equipment when not feeling well due to fatigue, illness or taking medicine.
- **NEVER** operate the trowel under the influence or drugs or alcohol.
- Replace nameplate, operation and safety decals when they become difficult to read.
- **ALWAYS** check the trowel for loosened hardware such as nuts and bolts before starting.
- **NEVER** touch the hot exhaust manifold, muffler or cylinder. Allow these parts to cool before servicing the trowel. Contact with ***hot!*** components can cause serious burns.

- The engine of this trowel requires an adequate free flow of cooling air. **NEVER** operate the trowel in any enclosed or narrow area where free flow of the air is restricted. If the air flow is restricted it will cause serious damage to the engine and may cause injury to people. Remember the engine can give off harmful toxins and will displace oxygen.



- **ALWAYS** refuel in a well-ventilated area, away from sparks and open flames.
- Topping-off to filler port is dangerous, as it tends to spill fuel.
- **NEVER** use fuel as a cleaning agent.
- **ALWAYS** use extreme caution when working with **flammable** liquids. When refueling, **STOP** the engine. Allow the engine to cool before adding fuel or performing service and maintenance functions.
- **NEVER** operate the trowel in an explosive atmosphere where fumes are present, or near combustible materials. An explosion or fire could result in severe ***bodily harm or even death***.



- **NEVER** ***smoke*** around or near the machine. Fire or explosion could result from ***fuel vapors***, or if fuel is spilled on a ***hot!*** engine.

- **NEVER** run engine without air filter. Severe engine damage may occur. Service air filter frequently to prevent carburetor malfunction.
- **NEVER** place your ***feet*** or ***hands*** inside the guard rings while starting or operating this equipment.
- **AVOID** wearing jewelry or loose fitting clothing that may snag on the controls or moving parts as this can cause a serious injury.
- **ALWAYS** keep clear of ***rotating*** or ***moving parts*** while operating the trowel.
- **Moving Parts** – Shut down the engine before performing service or maintenance functions. Contact with moving parts can cause serious injury.
- **ALWAYS** check to make sure that the operating area is clear before starting the engine.
- **NEVER** leave the machine ***unattended*** while running.
- **ALWAYS** be sure the operator is familiar with proper safety precautions and operations techniques before using trowel.
- **ALWAYS** keep the work area well organized.
- **ALWAYS** clear the work area of any debris, tools, etc. that would constitute a hazard while the trowel is in operation.

⚠ WARNING

ALWAYS check to make sure that the operating area is clear before starting the engine.

- No one other than the operator is to be in the working area when the trowel is in operation.
- **NEVER** allow passengers or riders on the trowel during operation.
- Always observe all applicable compulsory regulations relevant to environmental protection, especially, fuel storage, the handling of hazardous substances, and the wearing of protective clothing and equipment. Instruct the user as necessary, or, as the user, request this information and training.
- **ALWAYS** store equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of the reach of children.

⚠ DANGER

Pay close attention to ventilation when operating the trowel in confined spaces such as tunnels, buildings or similar areas. The engine exhaust contains harmful elements. Ensure proper air flow to move engine exhaust away from the operator.

Lifting the Ride-On Trowel

⚠ CAUTION

This ride-on trowel is very ***heavy*** and awkward to move around. Use proper heavy lifting procedures and **DO NOT** attempt to lift the ride-on trowel by the guard rings.

The HHN-34TVD Ride-On Power Trowel is designed to be moved and handled several ways.

The easiest way to lift the trowel is to utilize the lift loops that are welded to the frame. These lift loops are located to the left and right sides of the operator's seat.

A strap or chain can be attached to these lift loops, allowing a forklift or crane to lift the trowel up onto and off of a slab of concrete. The strap or chain should have a minimum 2,000 pounds (1000-kg) lifting capacity and the lifting gear must be capable of lifting at least this amount.

⚠ DANGER

NEVER stand under or allow anyone else to stand under the trowel while it is being lifted.

Transporting

- **ALWAYS** shutdown engine before transporting.
- Tighten fuel tank cap securely and close fuel cock to prevent fuel from spilling.
- Drain fuel when transporting trowel for long distances or over bad roads.
- When placing the trowel on a truck-bed for transport, ***always*** tie-down the trowel.
- If the trowel is being transported via a trailer, make sure the trailer complies with all local and state safety transportation laws. Refer to the following "***Towing Safety Precautions"*** for basic towing techniques.

Towing Safety Precautions

⚠ CAUTION

Conform to ***Department of Transportation (DOT) Safety Towing Regulations*** before transporting trowel on public roads.

To reduce the possibility of an accident while transporting the trowel on public roads, always make sure the trailer that supports the trowel and the towing vehicle are in good operating condition and both units are mechanically sound.

The following list of suggestions should be used when towing your trowel:

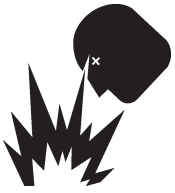
- Make sure the hitch and coupling of the towing vehicle are rated equal to, or greater than the trailer "gross vehicle weight rating" (GVWR) of 6,000 lbs.
- **ALWAYS** inspect the hitch and coupling for wear. **NEVER** tow a trailer with defective hitches, couplings, chains, etc.
- Check the tire air pressure on both towing vehicle and trailer. ***Trailer tires should be inflated to 50 psi cold***. Also check the tire tread wear on both vehicles.
- **ALWAYS** make sure the trailer is equipped with "**Safety Chains** ".
- **ALWAYS** attach trailer's safety chains to towing vehicle properly.
- **ALWAYS** make sure the vehicle and trailer directional, backup, brake, and trailer lights are connected and working.
- **DO NOT** exceed the recommended highway speed when towing.
- Use chock-blocks underneath each wheel when parked to prevent trailer from rolling.
- Use the trailer's swivel jack to adjust the trailer height to a level position while parked.
- Avoid sudden stops and starts. This can cause the trailer to skid or jack-knife. Smooth, gradual starts and stops will improve towing.
- Avoid sharp turns.
- Trailer should be adjusted to a level position at all times when towing.
- Raise and lock trailer wheel stand in the "**UP**" position when transporting.
- DOT requirements include the following:

  Connect and test electric brake operation.

  Secure portable power cables in cable tray with tie wraps.

Battery

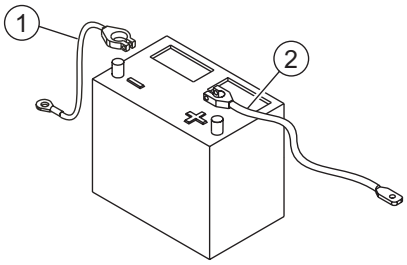
The battery contains acid that can cause injury to the eyes and skin. To avoid eye irritation, ***always*** wear safety glasses or face shielding. Use well insulated gloves when handling the battery. Use the following guidelines when handling the battery.



- **DO NOT** drop the battery. Any impact to the battery may cause it to explode.
- **DO NOT** expose the battery to open flames, sparks, lit cigarettes etc. The battery contains combustible gases and liquids. If these gases and liquids come in contact with a flame or spark an explosion can occur.
- **ALWAYS** keep the battery charged. If the battery is not charged a buildup of combustible gas will occur.
- **ALWAYS** keep battery cables in good working condition. Repair or replace all worn cables.
- **ALWAYS** disconnect the ***negative battery terminal*** before performing service on the trowel.
- **ALWAYS** recharge the battery in a vented air environment to avoid risk of a dangerous concentration of combustible gases.
- In case the battery electrolyte liquid, (dilute sulfuric acid), comes in contact with ***clothing or skin***, rinse skin or clothing immediately with plenty of water.
- In case the battery electrolyte liquid, (dilute sulfuric acid), comes in contact with your ***eyes***, rinse eyes immediately with plenty of water, then contact the nearest doctor or hospital and seek medical attention.

- Replace batteries that have cracked or broken cases or batteries that are otherwise leaking electrolyte.
- A good practice is to isolate the machine when removing the battery.
- Always replace with battery of equivalent type and rating. Never replace with a non-rechargeable battery.
- Orientation of the Battery

The positive cable , normally red, is associated with the "**+**" symbol on the battery. The negative cable, normally black, is associated with the "**-**" symbol on the battery. The positive cable is connected to the positive terminal on the battery and the negative cable is connected to the negative terminal.



1. **Negative Cable (BLACK)**
2. **Positive Cable (RED)**

- Always dispose of battery properly. Bring to appropriate facility for lead reclamation. These facilities can generally be found in the local phone listings under "Recycling Services".

Maintenance Safety

- **ALWAYS** shut down the engine and disconnect battery before performing service or maintenance functions. Contact with moving parts can cause serious injury.
- Securely support any trowel components that must be raised.
- **NEVER** lubricate components or attempt service on a running trowel.
- **ALWAYS** allow the trowel a proper amount of time to cool before servicing.
- Keep the trowel in proper running condition.
- Make sure that there is no buildup of concrete, grease, oil or debris on the machine.
- Fix damage to the trowel immediately and always replace broken parts.

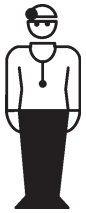
- **DON'T POLLUTE!** Waste oils and other chemicals must be disposed of in a manner consistent with local and state environmental protection regulations. Examples of potentially hazardous waste are used motor oil, fuel and fuel filters.
- **DO NOT** use plastic food containers to dispose of hazardous waste.
- **DO NOT** pour waste, oil or fuel directly onto the ground, down a drain or into any water source.

Emergencies

- **ALWAYS** know the location of the nearest ***fire extinguisher.***

- **ALWAYS** know the location of the nearest ***first aid kit.***

- Know the phone numbers of the nearest ***ambulance***, ***doctor*** and ***fire department***. Ensure that a phone or radio is readily available at the jobsite. If this is not possible, know the location of the nearest phone. This information will be invaluable in the event of an emergency.



Machine Safety Decals

The HHN-34TVD Ride-On Power Trowel is equipped with a number of operation and safety decals. These decals are provided for operator safety and maintenance information. Should any of these decals become unreadable, replacements can be obtained from your dealer.

P/N 20926

P/N 11811

P/N 1499 RED TEXT

P/N: 21455

P/N 10818 WHITE TEXT 24” x 3”

CONTACT
SERVICE
DEPARTMENT

P/N 35168

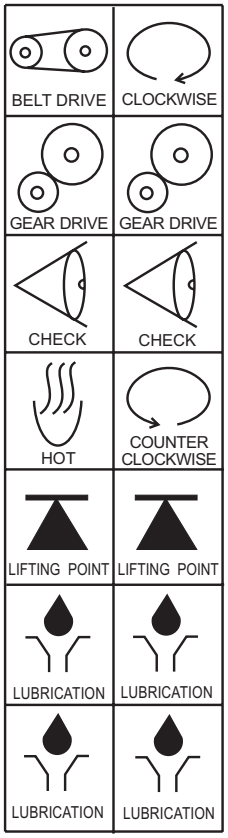
WARNING
To avoid injury, you MUST read and understand operator's manual before using this machine.
This machine to be operated by qualified personnel only.
Ask for training as needed.

P/N 35137

P/N 36099 (ISO Blue)

P/N 2814 (WHITE)

P/N 21517 (WHITE TEXT)



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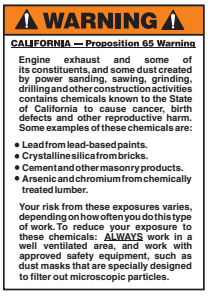

WARNING
CALIFORNIA — Proposition 65 Warning
Engine exhaust and some of its constituents, and some dust created by power sanding, sawing, grinding, drilling and other construction activities contains chemicals known to the State of California to cause cancer, birth defects and other reproductive harm. Some examples of these chemicals are:
Lead from lead-based paints.
Crystalline silica from bricks.
Cement and other masonry products.
Arsenic and chromium from chemically treated lumber.
Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: ALWAYS work in a well ventilated area, and work with approved safety equipment, such as dust masks that are specially designed to filter out microscopic particles.

P/N 20525

P/N: 13118

Figure 1. HHN-34TVD Decals & Safety Labels

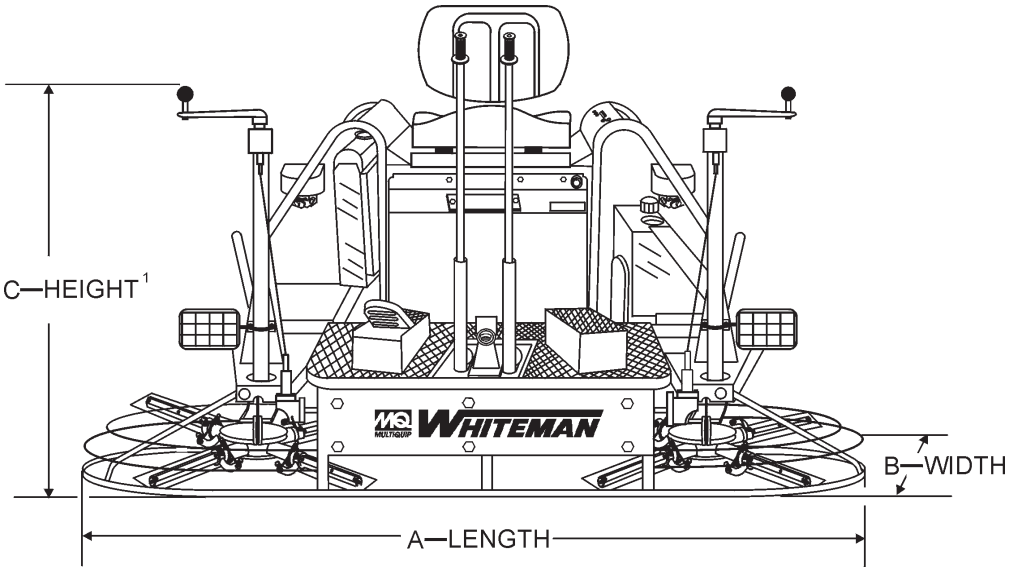


Figure 2. HHN-34TVD Dimension Specifications

Table 1. HHN-34TVD Specifications	
A–Length – in. (cm)	97.0 (246.4)
B–Width – in. (cm)	50.0 (127)
C–Height – in. (cm)[1]	46.0 (117)
Weight – lbs. (kgs.) Operating	1,092 (500)
Weight – lbs. (kgs.) Shipping	1,274 (578)
Sound Pressure – dBA[2]	TBD
Vibration – ft/s^2 (m/ s^2)[3]	TBD
Engine – H.P.	34
Fuel Tank – gallons (liters)	5 (19)
Rotor – RPM	60 to 160
Path Width – in. (cm)	91 (231)
Lubrication Oil	ISO 220 GR 5EP
Gear Box Oil Capacity	144 OZ.
Fuel Consumption (Full Load)	0.54 LB/BHP-HR
Radiator Capacity	1.0 GAL.

NOTE:

1. This value does not include seat height. To obtain total height (seat) add 4 inches (10.2 cm.).
2. Sound pressure is "A" weighted . Measured at the operators ear position while the ride-on trowel is operating at full throttle on concrete in a manner most often experienced in "***normal*** " circumstances. Sound pressure may vary depending upon the condition of the concrete. Hearing protection is always recommended.
3. The vibration level indicated is the maximum RMS (Root Mean Square) value obtained at the handle grip while operating the ride-on trowel on curing concrete in a manner most often experienced in "***normal*** " circumstances. Values were obtained from all three axes of motion. The values shown represent the maximum RMS value from these measurements.

Table 2. HHN-34TVD Engine Specifications	
Model	**HHN34TVDTCSL Briggs 34 HP Engine**
Type	Briggs & Stratton, Vanguard diesel turbo engine. DM 954 DT
Cylinders	3
Piston Displacement	58.1 cu.in. (952 cc)
Bore and Stroke	2.83 in.x 3.07 in. (72 mm x 78 mm)
Max. Output	34 bhp/3600 rpm (25.35 Kw)
Max. Torque	58.3 lbf-ft (26.4 Kg) at 2300 rpm
Cooling System	fully jacketed water-cooled
Engine Oil Capacity	3.2 qt. (3 liters) 3.5 qt. (3.3 liters w/oil filter replacement)
Lubricating System	Pressure feed with spin-on filter
Fuel Tank	5 gal.(18.9 liters)
Fuel Delivery System	Fuel Injected
Helical Gearbox Gear Compound Capacity	144 oz. (4.26 liters) ISO 22O AGMA GR 5EP
Fuel	Diesel Fuel - minimum of 40 cetane rating
Starting System	Electric Starter - Glow Plug
Dry Weight	196 lbs. (89 Kg)
Dimensions (L x W x H)	17.27 in. x 17.82 in. x 19.74 in. (438.7 mm x 447.5 mm x 501.4 mm)

HHN -34TVD Ride-On Power Trowel Familiarization

The HHN-34TVD Ride-On Power Trowel is designed for the floating and finishing of concrete slabs.

Take a walk around your trowel. Take notice of all the major components (see Figures 3 and 4, pages 20 and 21) like the engine, blades, air cleaner, fuel system, fuel shut-off valve, ignition switch etc. Ensure engine and gearbox lubricant levels are within proper operating range.

Read all the safety instructions carefully. Safety instructions will be found throughout this manual and on the machine. Keep all safety information in good, readable condition. Operators should be well trained on the operation and maintenance of the trowel.

Look at the operator control levers. Grasp the control levers and move them around a bit. Observe how moving the control levers cause the gearboxes and frame to move.

Notice the foot pedal which controls the engine and blade speed. Also take a look at the main driveline of the trowel. Take note and reference how the belts look, this is the way the belts should look when adjusted properly.

Before using your trowel, test it on a flat watered down section of finished concrete. This trial test run will increase your confidence in using the trowel and at the same time it will familiarize you with the trowel's controls and indicators. In addition you will understand how the trowel will handle under actual conditions.

Engine

This Trowel is equipped with a liquid cooled 34 HP diesel engine. Refer to the engine owner's manual for specific instructions regarding engine operation. This manual is included with the trowel at the time of shipping. Please contact your nearest Multiquip Dealer should a replacement manual be required.

Blades

The blades of the HHN-34-TVD Ride-On Power Trowel finish the concrete as they are swirled around the surface. Blades are classified as combination (10 or 8 inches wide) and finish (6 inches wide). The HHN-34TVD Ride-On Power Trowels are equipped with four or five blades (depending on model), per rotor equally spaced in a radial pattern and attached to a vertical rotating shaft by means of a ***spider assembly***.

Figures 3 and 4 show the location of the controls, indicators and general maintenance parts. Each control may perform more than one function. The functions of each control or indicator is on pages 20 and 21.

Gearboxes

The HHN-34 TVD Ride-On Power Trowel consist of two separate gearbox assemblies that are enclosed in rugged cast aluminum gear cases.

The gearbox casing holds 50% more oil capacity than competitors, which allows more lubrication to be provided to critical points.

Steering

Dual control levers located in front of the operator's seat are provided for steering this trowel. The control levers are linked to two spring loaded cylinders.

Push the left control lever forward and pull the right control lever backward and the trowel will rotate clockwise on approximately a center axis. Pull the left control lever backward and push the right control lever forward and the trowel will rotate counterclockwise. See Table 3 on page 26 for a complete description on the control levers directional positioning.

Constant Velocity Joints (CV-Joints)

Constant velocity joints insure the efficient transfer of power to the drive shaft and maintain the timing of the gearboxes without any chance of slippage.

Training

For training, please use the "**TRAINING CHECKLIST**" located in the front of this manual (Page 9). This checklist is not intended to be a substitute for proper training but will provide an outline for an experienced operator to provide training to a new operator.

1. **Seat –** Provides comfortable position for operation of the trowel. Engine will not start unless operator is seated. Seat is adjustable, fore and aft for operator comfort.
2. **Steering Control Lever (right side)** -Allows the unit to move in either a forward, reverse left or right direction.
3. **Retardant Spray Control Buttons –** When pressed allows retardant spray to flow through the spray nozzle located at the front of the machine.
4. **Twin Pitch Control (Right) –** Adjusts the blade pitch for right side of the trowel. Turn the crank as marked on its top surface to increase or decrease blade pitch.
5. **Twin Pitch Control (Left) –** Adjusts the blade pitch for left side of the trowel. Turn the crank as marked on its top surface to increase or decrease blade pitch.
6. **Steering Control Lever (left side)** -Allows the unit to move in either a forward, reverse left or right direction.
7. **Light Switch –** When activated, turns on four halogen lights. Lights offer better visibility when working indoors.
8. **Ignition Switch –** With key inserted turn clockwise to start engine.
9. **Oil Indicator Light -** Lights red when oil pressure is low.
10. **Water Indicator Light -** Lights red when water temperature is high.
11. **Charge Indicator -** Lights red when electrical system is not charging properly.
12. **Hour Meter -** Indicates number of hours the key switch is in the "ON" position.
13. **Preheat Light -** Lights blue when glow plugs are energized.
14. **Fuel Gauge/Filler Cap -** Indicates the amount of fuel in the fuel tank. Remove this cap to add fuel.
15. **Fuel Tank -** Holds 5 gallons of fuel.
16. **Spare Belt Carrier -** Contains a spare belt. Belt is used on the drive pulley.
17. **Left Foot Riser** – Operator foot rest pedal.
18. **Spray Nozzles –** Spray nozzle for retardant.
19. **Right Foot Pedal –** Controls blade speed. Slow blade speed is accomplished by slightly depressing the foot pedal. Maximum blade speed is accomplished by fully depressing the foot pedal.
20. **EZ- Mover Boss –** Front -side insertion point for EZ Mover. Used when the transporting of the trowel is required.
21. **Fuel Filter Light -** Lights red when water level rises in the Fuel Filter/Separator. See engine manual for draining instructions.

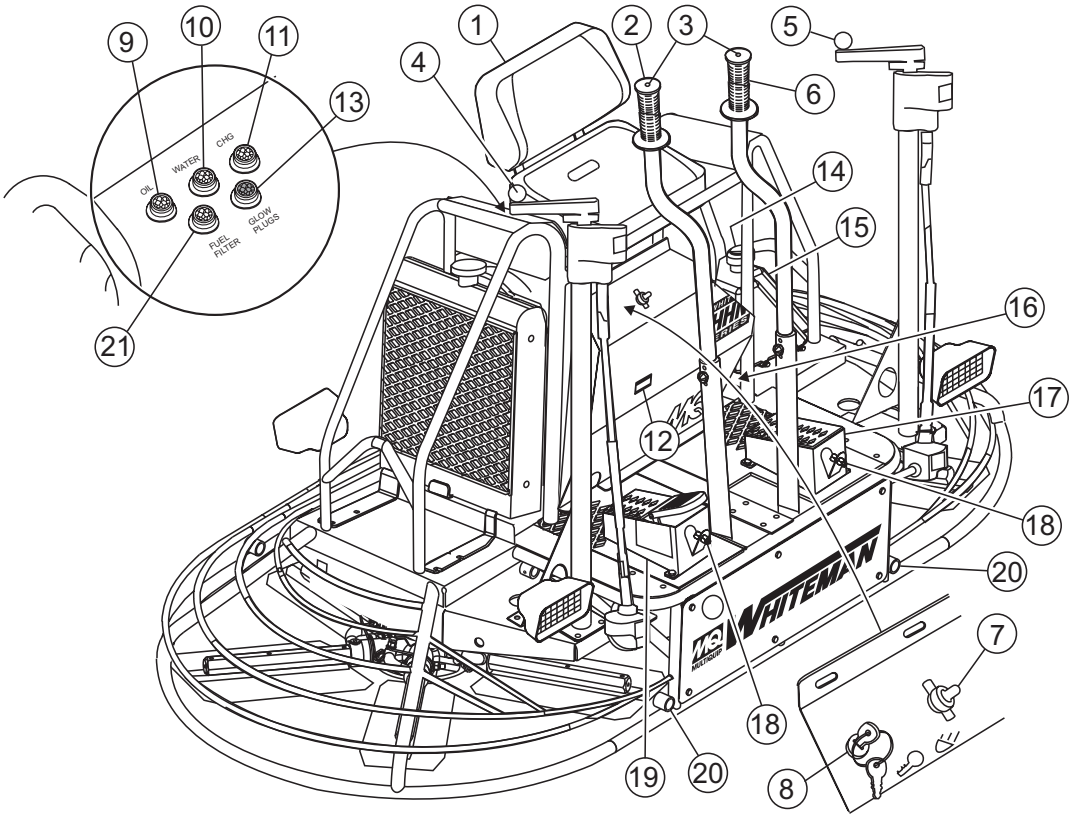


Figure 3. HHN-34TVD Controls and Indicators (Front)

22. **Lift Loops –** Located on both the left and right sides of the main frame. Used when the trowel must be lifted onto a concrete slab.
23. **Lights –** Four 12 volt halogen lights are provided with this unit.
24. **Right-Side Spider –** Consists (basic) of trowel arms, blades, wear plate, and thrust collar etc.
25. **Left-Side Spider –** Consists (basic) of trowel arms, blades, wear plate, and thrust collar etc.
26. **Radiator/Filler Cap –** Holds coolant or water necessary to keep engine at a safe operating temperature. Remove this cap to add water or antifreeze. **DO NOT** revove this cap when the engine is warm.
27. **Safety Stop Switch –** Shuts down engine when operator is **not** sitting in seat.
28. **Overflow Bottle -** Supplies coolant to the radiator when radiator coolant level is low. Fill to indicated level as shown on bottle.
29. **Engine Air Filter –** Prevents dirt and other debris from entering the fuel system. Lift locking latch on air filter cannister to gain access to filter element.
30. **Engine Dip Stick –** Indicates engine oil level. Add oil as required.
31. **Oil Filter –** Provides oil filtering for the engine.
32. **Battery –** Provides +12V DC power to the electrical system
33. **Retardant Spray Motors –** Used in conjunction with the left and right spray control buttons.
34. **Retardant Spray Tank –** Holds 5 gallons of retardant.
35. **Belt Guard –** Encloses drive belt used in conjunction with clutch.
36. **EZ- Mover Boss –** Back- side insertion point for EZ Mover. Used when the transporting of the trowel is required.
37. **Oil Sight Glass** - Indicates the level of the hydraulic oil in the gear box.

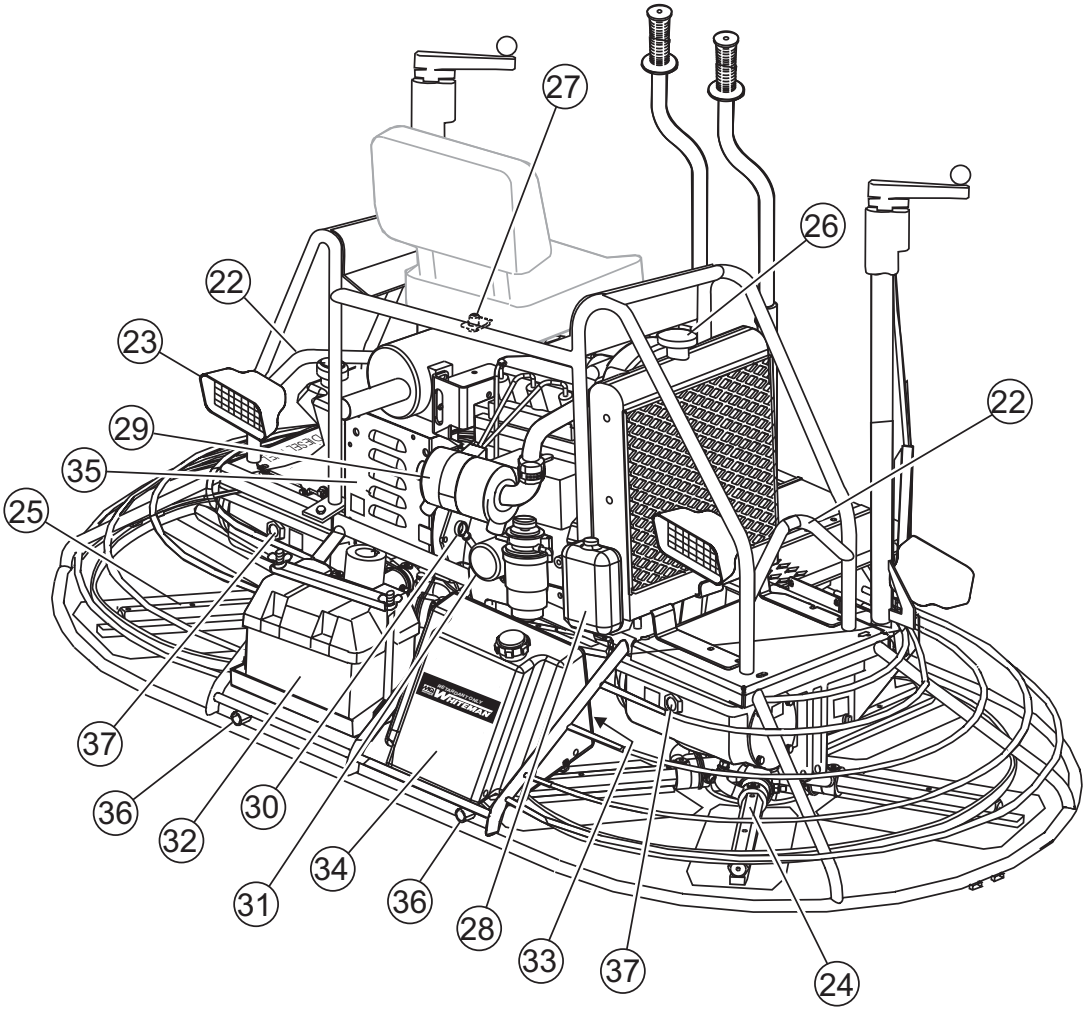
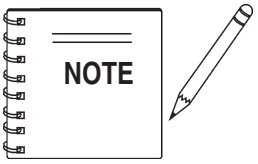


Figure 4. HHN-34TVD Controls and Indicators (Rear)

Trowel Pre-Set-Up Instructions

The purpose of this section is to assist the user in setting up a ***NEW*** trowel. If the trowel is already assembled, (seats, handles, knobs and battery), this section can be skipped.



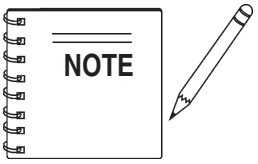
The new ride-on trowel cannot be put into service until the pre-setup installation instructions are completed. These pre-setup instructions only need to be performed at the time of unpacking a ***NEW*** trowel.

Before packaging and shipping this Ride-On Power Trowel was run and tested at the factory. If there are problems, please let us know.

Control Handle Assembly

The steering control handles are not attached to the trowel's two lower handles at the time of shipment. To attach the steering control handles to the lower handle assemblies perform the following:

1. Remove the bolts from the plastic bag tied to the control towers.
2. Remove all protective wrapping and straps from the control handles.
3. Slip the top (loose) control handle piece into the base of the corresponding handle, making sure to line up the holes.
4. Install the bolt through the lined up holes and tighten the acorn nut onto the threaded end.

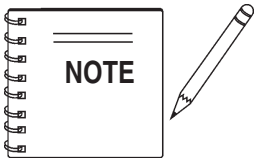


Models equipped with adjustable height handles are adjusted by placing the bolt through the set of holes that bring the handles to a height most comfortable for the operator.

5. Pay close attention to any wires that may be inside the control handles. **DO NOT** pinch or cut any wires during installation.
6. Remove the two knobs from the plastic bag for the pitch control tower cranks and install the knobs onto the tower crank levers.

Seat Assembly

The seat is not installed on the trowel for shipping purposes. To attach the seat perform the following:



H-series trowels have a seat that is mounted on tracks, similar to an automobile seat. This seat can be adjusted fore and aft via the control lever under the front of the seat.

1. Remove the seat from the protective wrapping.
2. Remove the bolts on the bottom of the seat, and place seat on the seat mounting plate, then insert the bolts through the holes or slots on the seat mounting plate and tighten.

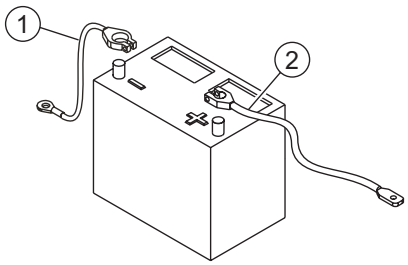
Battery Setup

This trowel was shipped with a wet charged battery. This battery may need to be charged for a brief period of time as per the manufacturer instructions.

⚠ CAUTION

Use all safety precautions specified by the battery manufacturer when working with the battery. See further specific safety information on page 14 & 15 of this manual.

To install the battery on the trowel, make sure that the battery is well seated in the battery box. The positive cable , normally red, is associated with the "**+**" symbol on the battery. The negative cable, normally black, is associated with the "**-**" symbol on the battery. Connect the positive cable to the positive terminal on the battery first, then connect the negative cable to the negative terminal. Close the plastic battery box cover and secure the battery box.



1. **Negative Cable (BLACK)**
2. **Positive Cable (RED)**

Figure 5. Battery Cable Orientation

BASIC ENGINE - DIESEL

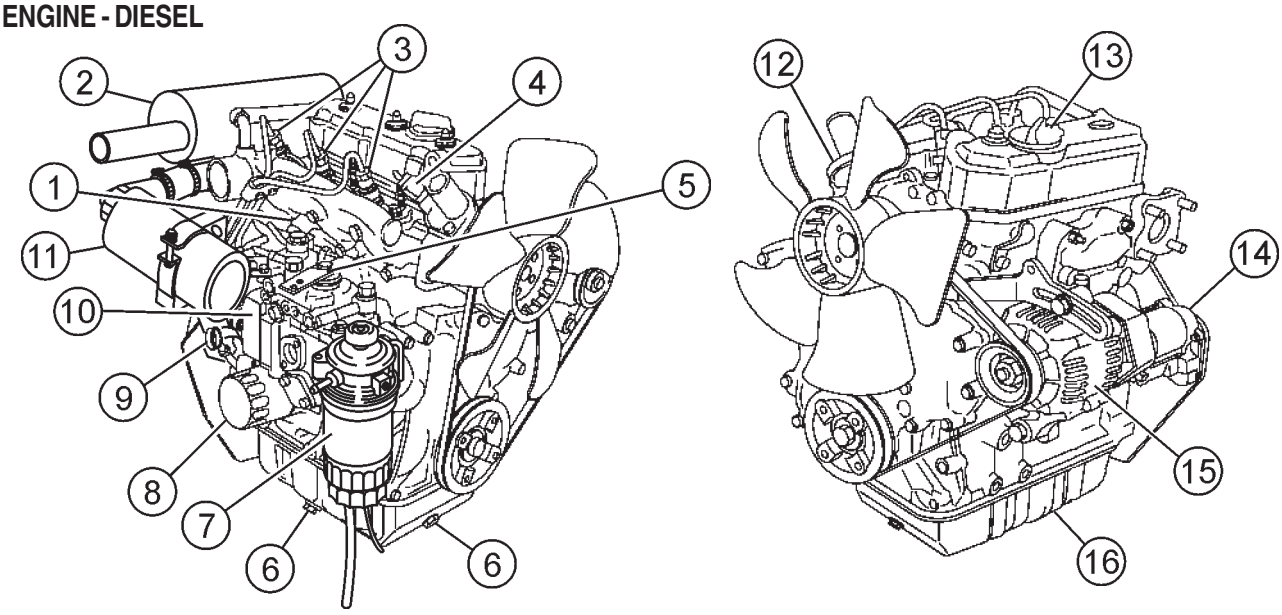


Figure 6. Diesel Engine Controls and Components

INITIAL SERVICING

The diesel engine (Figure 6) must be checked for proper lubrication and filled with fuel prior to operation. Refer to the manufacturer's engine manual for instructions & details of operation and servicing. The engine shown above is a **Briggs & Stratton Vanguard Diesel** engine. Operation for other types of engines may vary somewhat.

1. **Engine Tag –** Provided engine model identification and information.
2. **Muffler –** Used to reduce noise and emissions.

⚠ WARNING

Engine components can generate extreme heat. To prevent burns, **DO NOT** touch these areas while the engine is running or immediately after operating. **NEVER** operate the engine with the muffler removed.

3. **Fuel Injectors –** Provides diesel fuel mixture to combustion chambers.
4. **Glow Plug –** Energizes to aid in cold starting.
5. **Throttle lever –** Controlled by accelerator pedal, increases or decreases engine RPM.
6. **Oil Drain Plugs (2) –** Remove to drain crankcase oil. Always dispose of used oil and oil filters in an environmentally safe manner. **DO NOT** allow used oil to drain onto the ground or into a water runoff drain.
7. **Fuel Filter –** Filters fuel for contaminants.
8. **Oil Filter –** Spin-on type, filters oil for contaminants.
9. **Oil Dip Stick –** Remove to check amount and condition of oil in crankcase.
10. **Injector Pump –** Provides fuel to the fuel injectors.
11. **Air Filter –** Prevents dirt and other debris from entering the fuel system. Unsnap air filter cover to gain access to filter element.
12. **Thermostat**
13. **Oil Filler Cap –** Remove to add engine oil.
14. **Starter –** Starts engine when ignition key is rotated to the **"ON"** position.
15. **Alternator**
16. **Oil Pan**

This section is intended to assist the operator with the initial start-up of the HHN 34TVD trowel. It is extremely important that this section be read carefully before attempting to use the trowel in the field.

DO NOT use your trowel until this section is thoroughly understood.

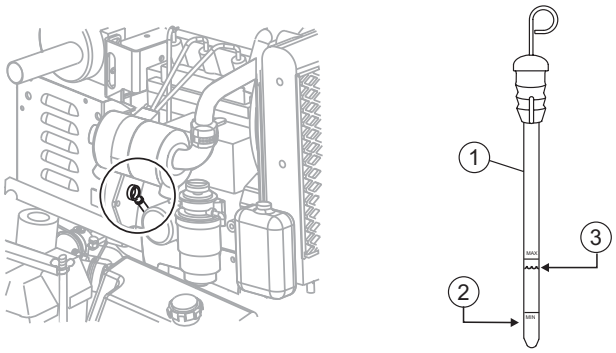
CAUTION

Failure to understand the operation of the HHN 34TVD Trowel could result in severe damage to the trowels or personal injury.

See Figures 3 and 4 (Pages 20 and 21) for the location of any control or indicator referenced in this manual.

Engine Oil Level

1. Pull the engine oil dipstick from its holder.
2. Determine if engine oil is low (Figure 7), add correct amount of engine oil to bring oil level to a normal safe level. (See Recommended Viscosity Grades, Table 4, Page 29).



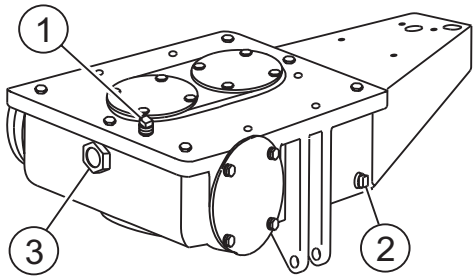
1 **Engine Oil Dipstick**
2 **Add Engine Oil**
3 **Safe Operating Oil Level**

Figure 7. Engine Oil Dipstick

Gearbox Oil Level

1. Check the gearbox oil level in both gearboxes by viewing the sight glass at the rear of the gearbox. See Figure 8.

2. The oil level of the gear box should be at the half-way point of the sight glass (Figure 8). The gear box oil capacity is 1 U.S. Gallon, (3.79 liters). If additional oil is required, unscrew the oil fill plug located on top of the gearbox, and refill with ISO 220 A GMA GR 5 EP oil.



1 **Fill Plug**
2 **Drain Plug**
3 **Sight Glass (Oil Check)**

Figure 8. Gearbox Oil Plugs/Sight Glass

Fuel

Determine if the engine fuel is low (Figure 9). If fuel level is low, remove the fuel filler cap and fill with appropriate engine fuel. The HHN34TVD uses diesel fuel.

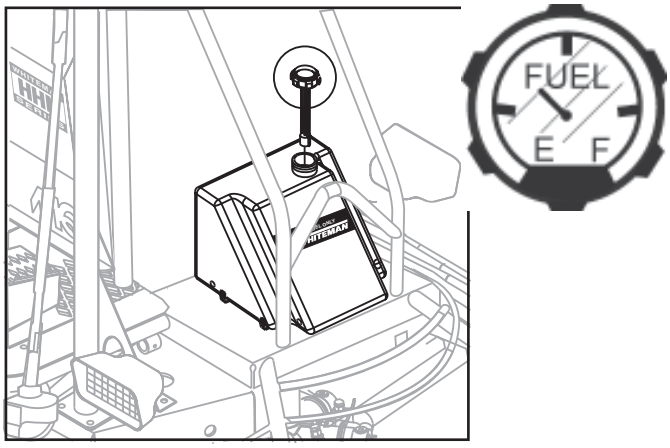


Figure 9. Fuel Gauge

CAUTION

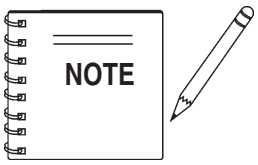
Handle fuel safely. Motor fuels are highly flammable and can be dangerous if mishandled. **DO NOT** smoke while refueling. **DO NOT** attempt to refuel the ride-on trowel if the engine is hot or running.

CAUTION

Never store the ride-on trowel with fuel in the tank for any extended period of time. Always clean up spilled fuel immediately.

Starting the Engine

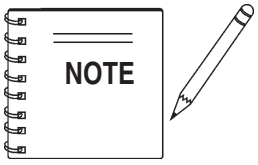
1. Place one foot on the trowel's platform, grab ahold of any part of the frame, lift yourself onto the trowel, then sit down in the operator's seat.



The HHN 34TVD trowel is equipped with a **safety stop switch** that will not allow the engine to start unless an operator is sitting in the operator's seat. The weight of an operator depresses an electrical switch, which allows the engine to start.

⚠ CAUTION

NEVER disable or disconnect the safety stop switch. It is provided for the **operator's safety** and injury may result if it is disabled, disconnected or improperly maintained.



Using the safey stop switch to stop the engine after every use will verify that the switch is working properly. Remember to turn the key to the "OFF" position after stopping the machine. Not doing so may drain the battery.

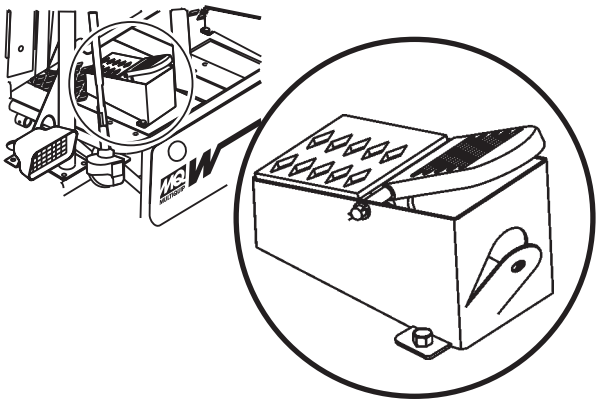
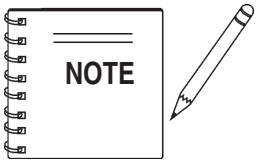
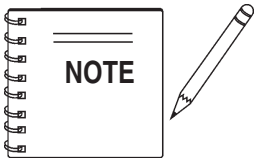


Figure 10. Blade Speed Control Foot Pedal

2. The right foot pedal (Figure 10) controls blade and engine speed. The position of the foot pedal determines the blade speed. Slow blade speed is obtained by slightly depressing the pedal. Maximum blade speed is obtained by fully depressing the pedal.
3. Keep your foot **OFF** the pedal (right foot pedal). Start the engine at idle (without touching the foot pedal).
4. Insert the ***ignition key*** into the ignition switch .
5. Turn the ignition key clockwise to the (start) position. The ***oil***, ***charge,*** and ***preheat*** indicator lights (Figure 11 should be **ON**.



If the engine is cold, wait for the preheat light to extinguish before starting.



OIL, **CHARGE**, and **PREHEAT** indicator lights come on when ignition switch is in the **ON** position, and the engine is **NOT** running.

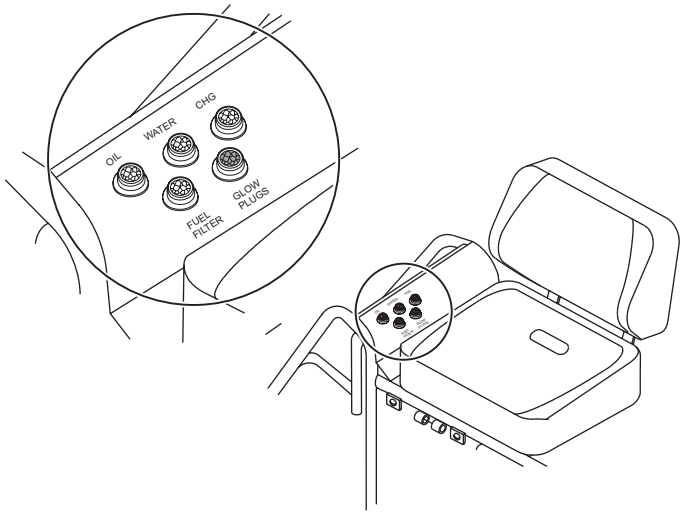
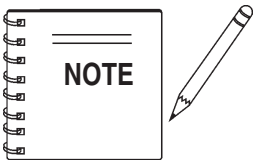


Figure 11. Oil and Charge Indicator Lights

6. Turn ignition key fully clockwise and listen for engine to start. Once engine has started release ignition key.
7. If the engine fails to start in this manner, consult the engine owner's manual supplied with the trowel.
8. Test the safety stop switch by standing up briefly. The switch under the seat should cause the engine to stop. If the switch fails to shut down the engine. Turn off the engine with the key switch and fix the safety stop switch. See Table 5 (Troubleshooting) for possible problems.
9. Repeat this section a few times to get fully acquainted with the engine starting procedure.

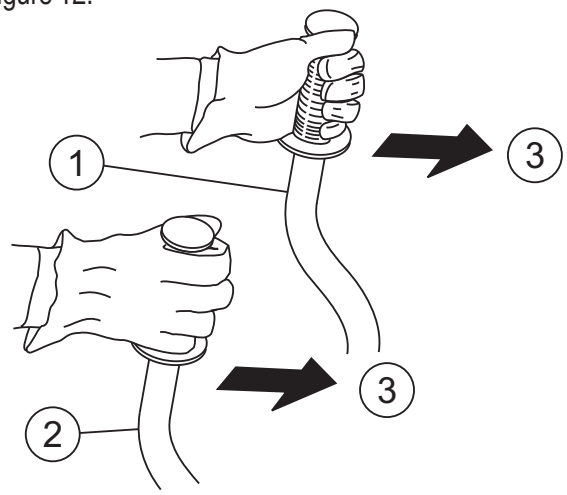
Steering

Two control levers located in front of the operator's seat provide directional control for the HHN 34TVD trowel. Table 3 illustrates the various directional positions of the joysticks and their effect on the ride-on trowel.



All directional references with respect to the steering control levers are from the ***operator's*** seat position.

1. Push both the left and right control levers forward. See Figure 12.



1 **Left Control Lever**
2 **Right Control Lever**
3 **Forward Direction**

Figure 12. Left and Right Control Levers

2. With your right foot quickly depress the right foot pedal halfway. Notice that the ride-on power trowel begins to move in a forward direction. Return both joystick controls to their neutral position to stop forward movement, then remove your right foot from the right foot pedal.

3. Practice holding the machine in one place as you increase blade speed. When about 75% of maximum blade speed has been reached, the blade will be moving at proper finishing speed. The machine may be difficult to keep in one place. Trying to keep the ride-on trowel stationary is a good practice for operation.

4. Practice maneuvering the ride-on trowel using the information listed in Table 3. Try to practice controlled motions as if you were finishing a slab of concrete. Practice edging and covering a large area.

5. Try adjusting the pitch of the blades. This can be done with the ride-on trowel stopped or while the trowel is moving, whatever feels comfortable. Test the operation of optional equipment like retardant spray and lights if equipped.

6. Push both the left and right joysticks backward and repeat steps 3 through 6 while substituting the word reverse for forward.

Table 3. Control Lever Directional Positioning

CONTROL LEVER & DIRECTION	RESULT
Move **LEFT** Control Lever FORWARD	Causes only the left side of the ride-on trowel to move forward.
Move **LEFT** Control Lever BACKWARD	Causes only the left side of the ride-on trowel to move backward.
Move **RIGHT** Control Lever FORWARD	Causes only the right side of the ride-on trowel to move forward.
Move **RIGHT** Control Lever BACWARD	Causes only the right side of the ride-on trowel to move backward.
Move **BOTH** Control Levers FORWARD	Causes the ride-on trowel to move forward in a straight line.
Move **BOTH** Control Lever BACKWARD	Causes the ride-on trowel to move backard in a straight line.
Move **BOTH** Control Levers to the RIGHT	Causes the ride-on trowel to move to the right.
Move **BOTH** Control Levers to the LEFT	Causes the ride-on trowel to move to the left.

⚠ CAUTION

Trowel arms can be damaged by rough handling or by striking exposed plumbing or forms while in operation. ***ALWAYS*** look-out for objects which might cause damage to the trowel arms.

MAINTENANCE

When performing maintenance on the trowel or engine, follow all safety messages and rules for safe operation stated at the beginning of this manual.

See the engine manual supplied with your machine for appropriate engine maintenance schedule and troubleshooting guide for problems.

WARNING

Accidental starts can cause severe injury or death.

ALWAYS place the ON/OFF switch in the OFF position.

Disconnect negative battery cable from battery before servicing.

ALWAYS allow the engine to cool before servicing. **NEVER** attempt any maintenance work on a hot! (muffler, radiator, etc.) trowel.

MAINTENANCE SCHEDULE

Daily (8-10 Hours)

1. Check the fluid levels in the engine and gearboxes, fill as necessary.
2. Check V-belt.

Weekly (30-40 Hours)

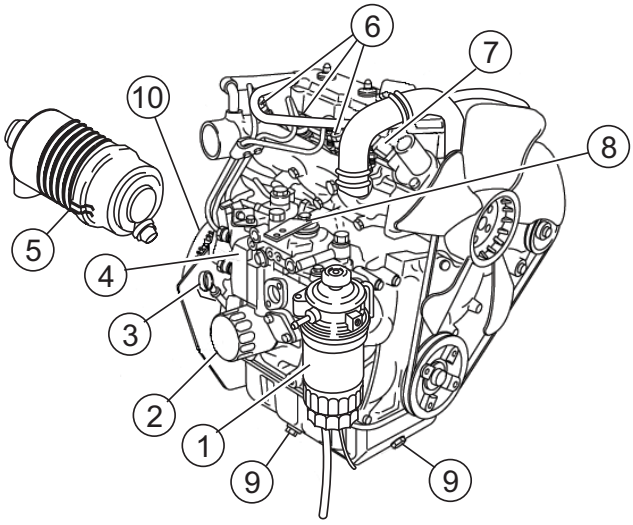
1. Relube arms, thrust collar and steering links.
2. Replace blades if necessary.
3. Check the engine air filter and change as necessary.

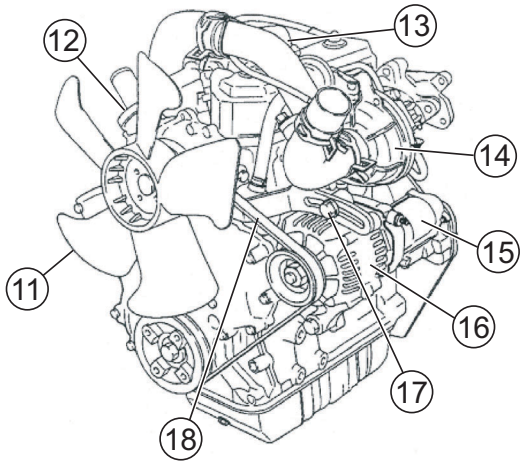
Monthly (100-150 Hours)

1. Remove, clean, reinstall and relube the arms and thrust collar. Adjust the blade arms.
2. Replace gearbox lubricant after the first 100 hours of operation. Replace every 500-600 hours.
3. Check drive belt for excessive wear.
4. Replace engine oil and filter as necessary, see engine manual.

Yearly (500-600 Hours)

1. Check the arm bushings, thrust collar bushings, shaft seals and belts. Replace if necessary
2. Check pitch control cables for wear.
3. Replace gearbox lubricant.
4. Check and adjust blade speed.





1. **Fuel Filter**
2. **Oil Filter**
3. **Dipstick (engine oil)**
4. **Injector Pump**
5. **Air Cleaner**
6. **Fuel Injectors**
7. **Glow Plug**
8. **Throttle Lever**
9. **Oil Drain Plugs**
10. **Flywheel**

11. **Cooling Fan**
12. **Thermostat**
13. **Oil Filler Cap**
14. **Turbocharger**
15. **Electric Starter Motor**
16. **Alternator**
17. **Adjustment Bolt (V-belt tension)**
18. **V-belt**

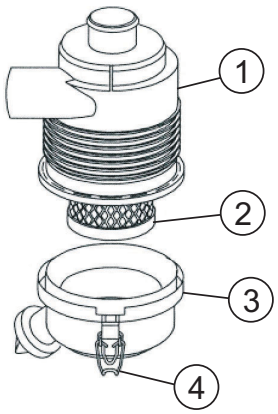
Figure 13. Engine Service Areas

WARNING

Certain maintenance operations or machine adjustments require specialized knowledge and skill. Attempting to perform maintenance operations or adjustments without the proper knowledge, skills or training could result in equipment damage or injury to personnel. If in doubt, consult your dealer.

Air Cleaner (Daily)

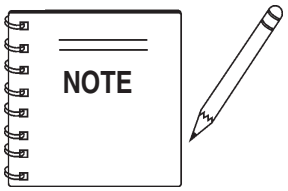
The Vanguard 34 hp turbo diesel engine is equipped with a replaceable, high-density paper air cleaner element. Check the air cleaner daily or before starting the engine. Check for and correct heavy buildup of dirt and debris along with loose or damaged components, (Figure 14).



1. **Air Cleaner Body**
2. **Cartridge**
3. **Cover**
4. **Latches (Cover Clamps)**

Figure 14. Air Cleaner Components

1. Unlock the cover clamps (4) and remove cover (3).
2. Remove cartridge (2) from air cleaner body (1).
3. Clean cartridge by gently tapping the end with the handle of a screwdriver. Replace cartridge if very dirty or damaged.
4. Carefully clean out the air cleaner cover.
5. Install cartridge in body.
6. Install cover and lock cover clamps.



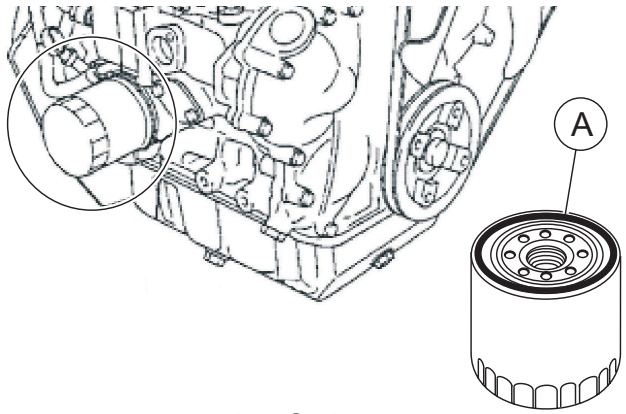
Operating the engine with loose or damaged air cleaner components could allow unfiltered air into the engine causing premature wear and failure.

Changing Engine Oil And Filter

1. Change the engine oil and filter after the first 5 hours of use, then change oil every 6 months or 150 hours.
2. Remove the oil filler cap (Figure 22, Item 6), and fill engine crankcase with recommended type oil as listed in Table 4. Fill to the upper limit of dipstick.
3. Crankcase oil capacity with oil filter replacement is 6.72 qts. (7.4 liters).

Oil Filter (300 Hours)

1. Replace the engine oil filter (Figure 15) every other oil change or 300 hours. Refer to your engine manual for specific details to perform this operation.

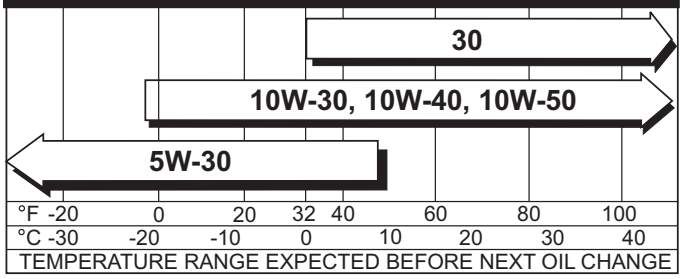


A. **Seal**

Figure 15. Oil Filter

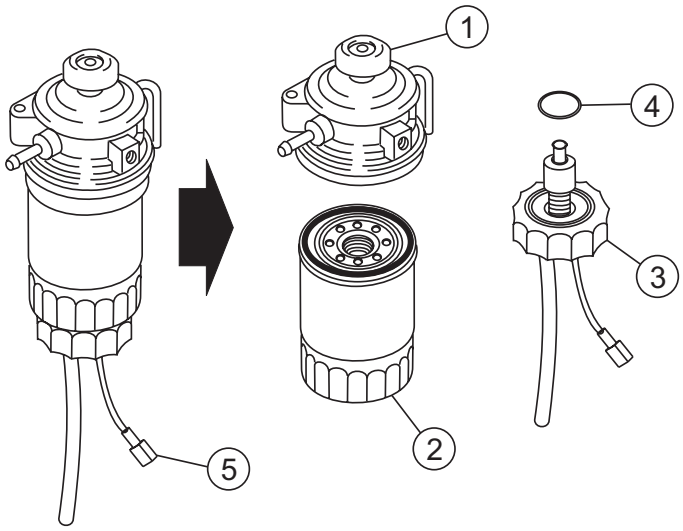
2. Be sure to coat the ***seal*** (Item A) of the new oil filter with clean engine oil.

Table 4. Recommended Viscosity Grades



Fuel Filter

- Replace the engine fuel filter (Figure 16) every 800 hours. Refer to your engine manual for specific details to perform this operation.



1. **Priming Pump**
2. **Fuel Filter**
3. **Drain Plug**
4. **O-Ring**
5. **Sensor Wire**

Figure 16. Fuel Filter

Oil/Water Separator

Drain water from the bottom of the fuel filter by loosening the drain plug and allowing the water to drain out. Refer to your engine manual for specific details to perform this operation.

Oil And Fuel Lines

- Check the oil and fuel lines and connections regularly for leaks or damage. Repair or replace as necessary.
- Replace the oil and fuel lines every two years to maintain the line's performance and flexibility.

Radiator/Cooling System

WARNING

Hot coolant can cause severe burns. **DO NOT** remove cap if radiator is HOT.

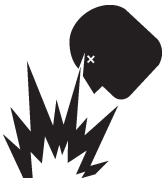
1. Check and clean radiator fins.
2. Check cooling water.
3. Check radiator hoses for fatigue or cracking.
4. Check radiator cap seal.

Refer to your engine manual for additional information.

Battery/Charging System

WARNING

Flammable, explosive gas. (produces hydrogen gas while charging or during operation). Keep area around battery well ventilated and keep from any fire source.



Battery electrolyte contains corrosive, toxic chemical. (dilute sulfuric acid). Avoid contact with eyes and skin.

Shock or Fire due to electric short-circuit. Disconnect battery cables before inspecting electrical system and never "spark" battery terminals to test for charge.

1. Check and clean battery terminals for corrosion.
2. Check and keep battery electrolyte between upper and lower limits indicated on the battery. Never operate or recharge without sufficient fluid in the battery.
3. Never attempt to charge a battery that is frozen. The battery can explode unless first allowed to thaw.
4. Disconnect the negative terminal (-) of the battery during storage. If unit will be stored where ambient temperature will drop to -15° C or less, remove and store battery in a warm, dry place.

Long Term Storage

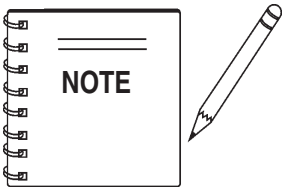
- Remove the battery.
- Drain fuel from fuel tank.
- Clean exterior with a cloth soaked in clean oil.
- Store unit covered with plastic sheet in moisture and dust-free location out of direct sunlight.

CAUTION

Never store the ride-on trowel with fuel in the tank for any extended period of time. Always clean up spilled fuel immediately.

Engine Tune-Up

- See your engine manual for specific information on tuning up your engine.



See the engine manual supplied with your machine for appropriate engine maintenance schedule and troubleshooting guide for problems.

At the front of the book (Page 11) there is a "Daily Pre-Operation Checklist". Make copies of this checklist and use it on a daily basis.

CAUTION

ALWAYS disconnect battery cables before attempting any service or maintenance on the ride-on trowel.

Checking The Drive Belt

The drive belt needs to be changed as soon as it begins to show signs of wear. **DO NOT** reuse a belt under any circumstances. Indications of excessive belt wear are fraying, squealing when in use, belts that emit smoke or a burning rubber smell when in use.

Under normal operating conditions, a drive belt may last approximately 150 hours. If your trowel is not reaching this kind of life span for drive belt wear, check the drive belt for proper pulley alignment and spacing .

To gain access to the drive belt, remove the drive belt guard cover, then visually inspect the drive belt for signs of damage or excessive wear. If the drive belt is worn or damaged, replace the drive belt.

WARNING

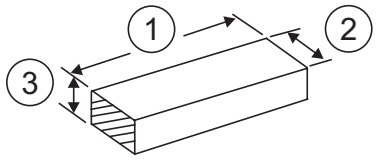
DO NOT attempt to insert hands or tools into the belt area while the engine is running and the safety guard has been removed. Keep fingers, hands, hair and clothing away from all moving parts to prevent bodily injury.

WARNING

DO NOT remove the V-belt guard cover until the muffler has cooled. Allow the entire trowel to cool down before performing this procedure.

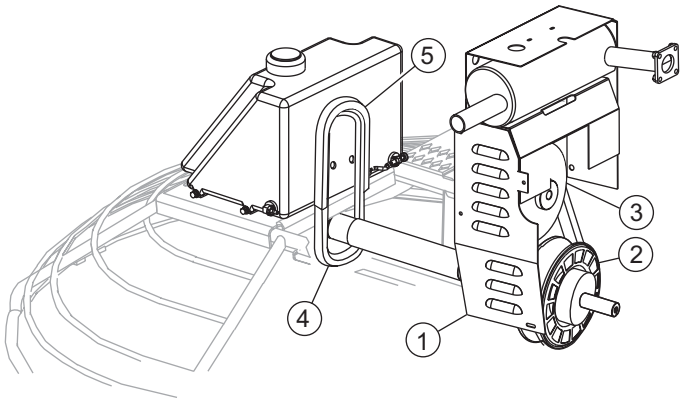
Removing the Drive Belt

- Leave the existing drive belt intact until instructed to cut it.
- Leave the engine in place for this procedure. It is not necessary to slide the engine to replace the drive belt.
- Have a 3/4 X 1 X 3-1/4 inch wooden block available.



1 **Length, 3.25 In. (82.5 mm)**
2 **Width, 1.00 In. (25.4 mm)**
3 **Height, .75 In. (19 mm)**

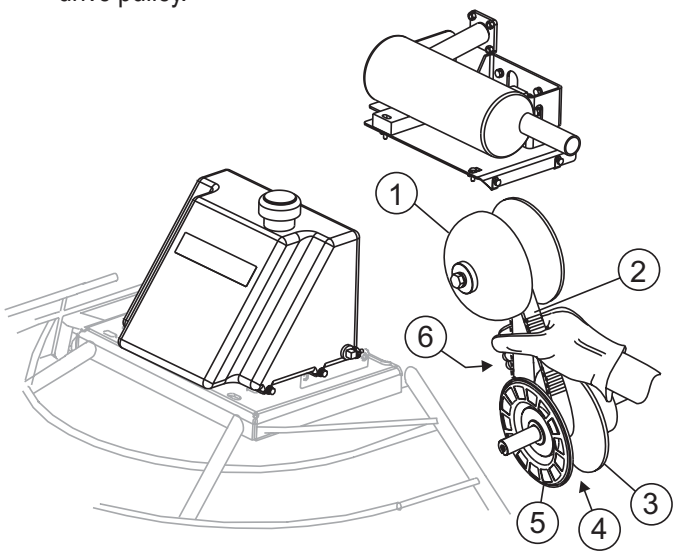
Figure 17. Wooden Block For Spacer



1 **Drive Belt Guard Cover**
2 **Lower Pulley**
3 **Upper Pulley**
4 **Spare Drive Belt**
5 **Spare Drive Belt Holder**

Figure 18. Drive Belt Guard Cover

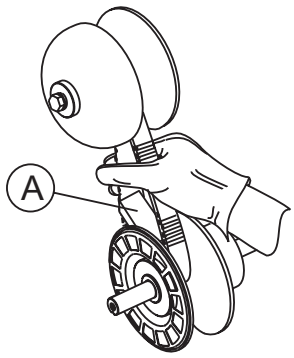
1. Remove Drive Belt Guard Cover (item 1 Figure 18).
2. Squeeze the drive belt as shown in Figure 19, and pull the V-belt upwards. This will spread open the faces of the ***lower*** drive pulley.



1 **Upper Pulley**
2 **Drive Belt**
3 **Lower Pulley Fixed Face**
4 **Lower Pulley Spread Apart**
5 **Lower Pulley Movable Face**
6 **Squeeze and Pull Up To Spread Lower Pulley**

Figure 19. Expanding Lower Drive Pulley

3. ***Insert*** the wooden block (Figure 17) between the moveable face and the fixed face of the lower drive pulley. See Figure 20. This block will help keep the lower drive pulley faces open while installing the new drive belt.



A **Wood Block**

Figure 20. Holding Lower Pulley Open

4. If the belt is not being reused (recommended), ***CUT*** the drive belt. Ensure all belt remnants are removed from the pulleys.

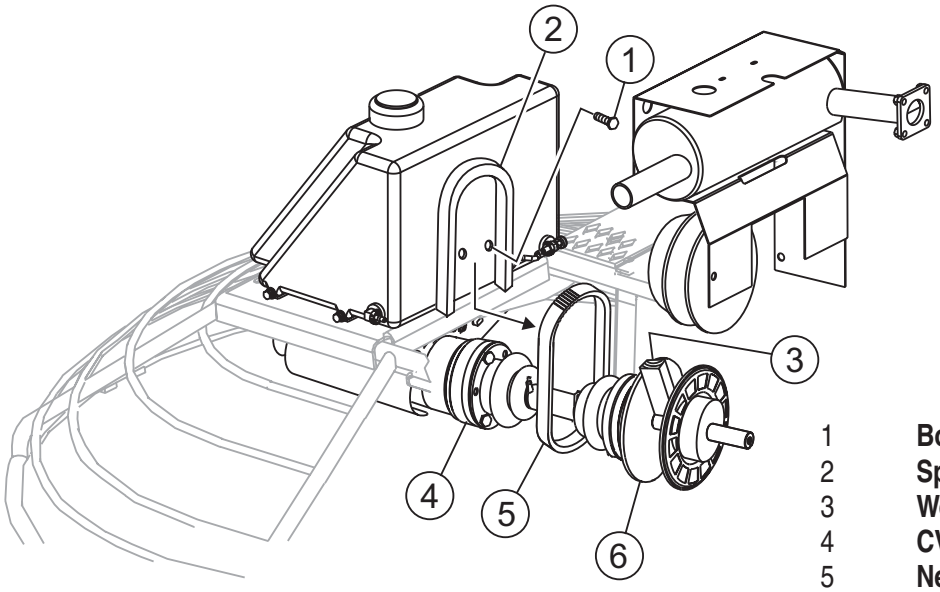
Installing the Drive Belt (Using Replacement Drive Belt)

The HHN-34TVD Ride-On Power Trowel is equipped with a replacement drive belt (spare) carrier, which is mounted on the inboard side of the fuel tank near the clutch. Make sure that there is **ALWAYS** a spare drive belt in the drive belt carrier before the trowel is placed on a slab to finish concrete.

In the event of a drive belt failure, the spare (replacement) drive belt can be used for quick replacement at the job site to continue trowel operation.

1. If necessary, refer to Removing Drive Belt Instructions. Ensure all remnants of old belt have been removed from pulleys.
2. To replace the drive belt with the spare drive belt, remove the 2 bolts that secure the drive belt carrier. (Figure 21) This will allow free movement of the belt for installation. Take care with to not contaminate the relplacement belt with grease or dirt.

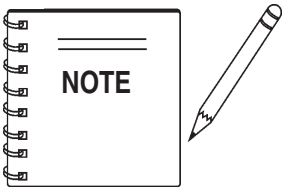
3. With the wood block holding the lower pulley open, (Figure 20), place the replacement belt into the lower pulley first. Work the belt over the upper drive pulley into the pulley groove.
4. Squeeze the belt enough to remove the wood block. With the block removed, release the tension on the belt.
5. Reinstall the spare belt carrier and the drive belt guard.
6. Replace the spare belt before the next trowel use. See spare drive belt replacement procedures.



1 **Bolt, Spare Drive Belt Carrier**
2 **Spare Drive Belt Holder**
3 **Wooden Block**
4 **CV-Joint**
5 **New Spare Drive Belt**
6 **Lower Drive Pulley**

Figure 21. Drive Belt Install

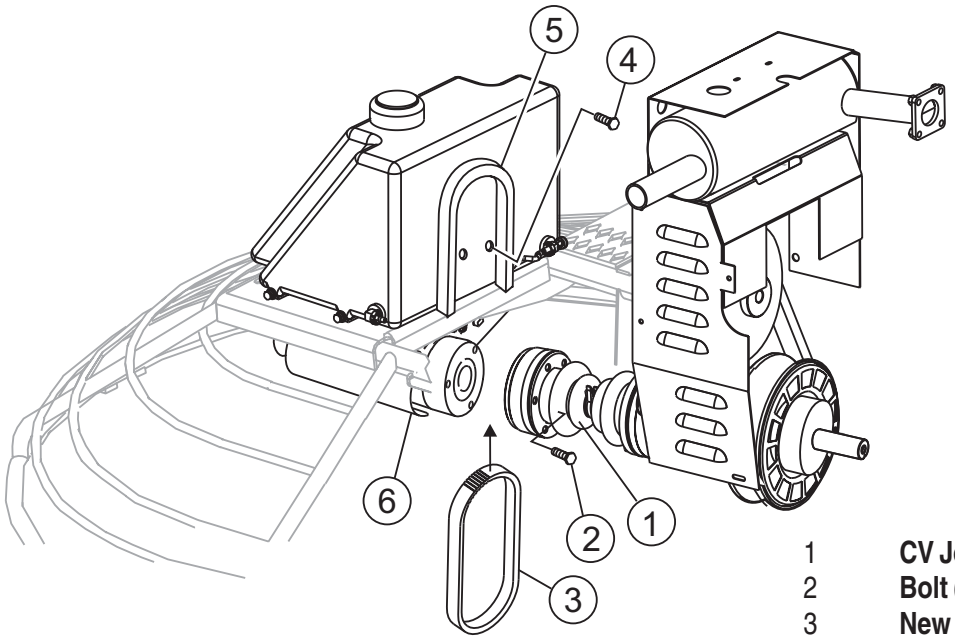
Spare Drive Belt Replacement



It **will** be necessary to disconnect the CV-Joint from the left-side gearbox coupler. This means the removal of the three screws that secure the CV-Joint to the gearbox.

To replace a spare drive belt, be prepared to disconnect the CV-joint from the left-side gearbox. See Figure 22.

1. Place the trowel on suitable supports and observe all safety precautions.
2. Remove the three screws that secure the CV-joint to the left-side gearbox coupler.
3. Once the CV-joint has been separated from the left-side gearbox, push the CV-joint inward so that a gap exists between the gearbox and the CV-joint (Figure 22). Slide the spare V-belt between the gearbox coupler and the CV-joint. Avoid contaminating the replacement belt with grease or oil when sliding it between the CV-Joint and gearbox coupler.
4. Place the spare drive belt inside the drive belt carrier, and secure the spare belt carrier to the inboard side of the left gearbox.
5. Install the three screws that secure the CV-joint to the left-side gearbox coupler.



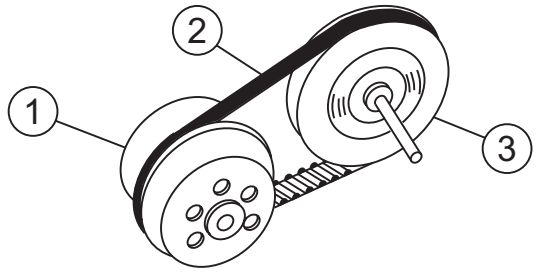
1 **CV Joint**
2 **Bolt (Remove 3 places)**
3 **New Spare Drive Belt**
4 **Bolt, Spare Drive Belt Carrier**
5 **Spare Drive Belt Holder**
6 **Left Side Gearbox**

Figure 22. Spare Drive Belt Replacement

The HHN 34TVD trowel is equipped with a "Torque Converter" which supplies torque to both the left and right gear boxes.

The function of the a torque converter is to automatically deliver the correct amount of torque required by the trowel under all load conditions. This enables the trowel to deliver the necessary torque for float pan applications and the high rotor speeds required for burnishing concrete.

The torque converter is of the variable pitch pulley type, (Figure 23) connected by a drive belt.

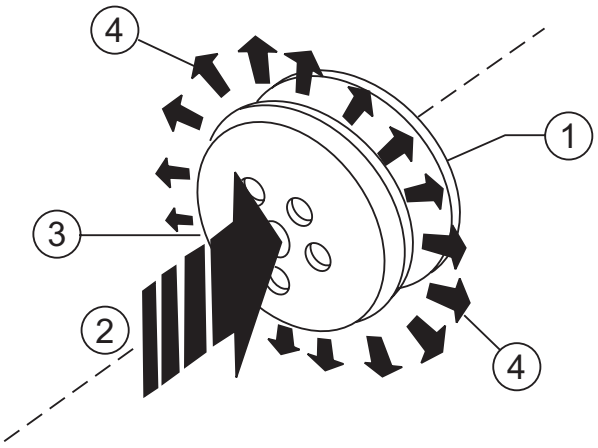


1 **Torque Converter**
2 **Drive V-Belt**
3 **Variable Pitch Pulley**

Figure 23. Torque Converter/Variable Pitch Pulley

Drive Pulley

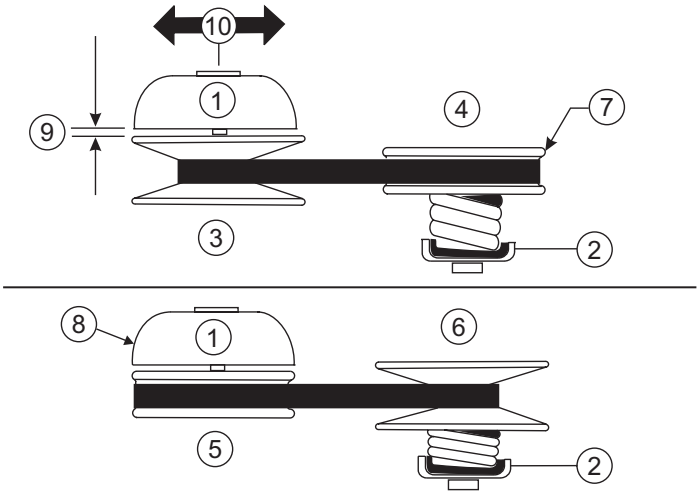
The **"Drive Pulley"** uses centrifugal force (Figures 24 and 25) to create a belt squeeze force transmitted at the pulley faces. This condition functions as an automatic clutch.



1 **Fixed Face**
2 **Belt Squeeze Force**
3 **Variable Face**
4 **Centrifugal Force (Outward-Arrows)**

Figure 24. Torque Converter (Centrifugal Force)

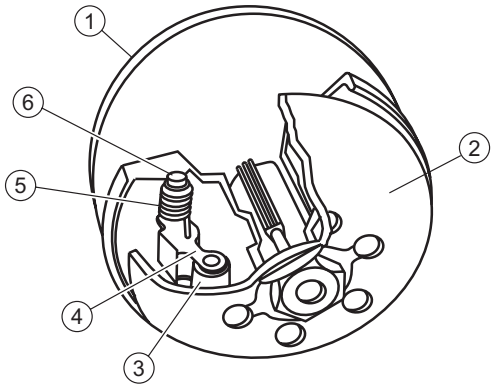
As shown in Figure 24, centrifugal force pushes the roller arms (see Figure 25 below) against the ramp plate, forcing moveable face toward fixed face squeezing belt.



1 **Drive Pulley**
2 **Driven Pulley**
3 **Low Engine RPM**
4 **Low Output Speed**
5 **High Engine RPM**
6 **High Output Speed**
7 **Moveable Face (Controlled by a Spring and Belt Tension)**
8 **Moveable Face (Controlled by Roller Weight Arms and Springs)**
9 **Distance Moveable Face Travels**
10 **Centrifugal Force**

Figure 25. Pulley Interaction

The "Variable Pitch Pulleys" have one ***fixed face***, and one ***moveable face***. The ***drive*** pulley (torque converter, Figure 26) moveable face is controlled by roller weight arms and springs, which change position according to engine speed. The ***driven*** pulley ***moveable face*** is controlled by a spring and belt tension.



1 **Drive Pulley**
2 **Ramp Plate**
3 **Weight**
4 **Roller Arm**
5 **Spring**
6 **Bushing**

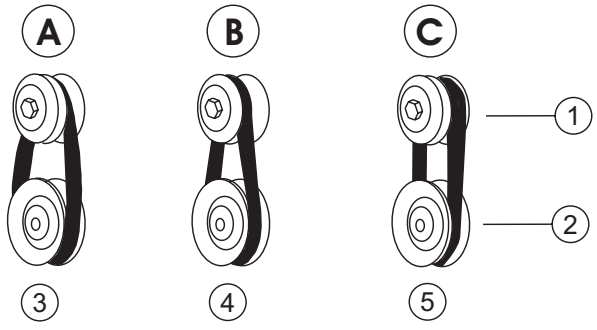
Figure 26. Variable Pitch Pulley

How It Works (Figure 27)

Condition A:
- Engine Idling
- Drive Pulley: Small
- Driven Pulley: Large
- Belt: Loose and Stationary

Condition B:
- Engine Accelerating
- Drive Pulley: Small But Increasing
- Driven Pulley: Large But Decreasing
- Belt: Approaching Tightness

Condition C:
- Engine At High Speed
- Drive Pulley: Large
- Driven Pulley: Small
- Belt: Tight



1 **Drive Pulley**
2 **Driven Pulley**
3 **Neutral**
4 **Low Speed**
5 **High Speed**

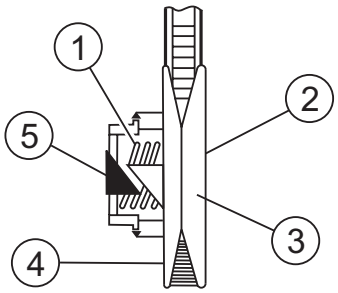
Figure 27. Pulley Conditions

Clutch

This clutch system provides a high pulley ratio (a low gear- so to speak) to start out and a low pulley ratio (a high gear- so to speak) for a high speed operation, with infinite variation between the two.

This means that it will not be necessary to give ***full throttle*** in order to "break the blades/pans loose". The machine can slowly be brought up to speed.

The torque sensitive pulley (Figure 28) utilizes a spring and cam bracket. Peak performance results from proper interaction between the driven pulley spring and the ramp angle of the cam bracket.



1 **Spring**
2 **Driven Pulley**
3 **Fixed Face**
4 **Moveable Face**
5 **Cam Bracket**

Figure 28. Pulley Spring and Cam Bracket

Blade Pitch

Matching Blade Pitch for Both Sets of Blades

Sometimes it may be necessary to match blade pitch between the two sets of blades. There are some signs that this may be necessary. For example, the differences in pitch could cause a noticeable difference in finish quality between the two sets of blades. Or, the difference in blade pitch could make the machine difficult to control. This is due to the surface area in contact with the concrete (the blade set with the greater contact area tends to stick to the concrete more).

Single Pitch™

On a Single Pitch™ trowel each spider assembly can be pitched individually, forcing the operator to constantly make adjustments on each pitch tower.

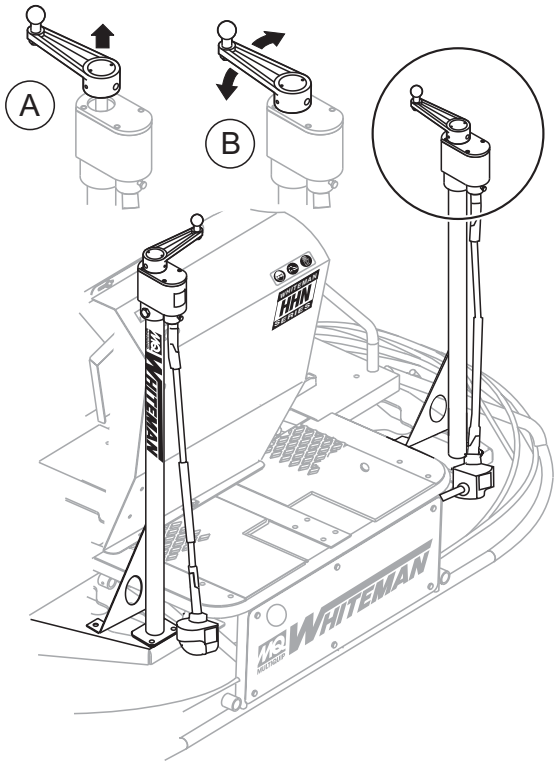
Blade Pitch

Sometimes it may be necessary to match blade pitch between the two sets of blades. There are some signs that this may be necessary. For example, the differences in pitch could cause a noticeable difference in finish quality between the two sets of blades. Or, the difference in blade pitch could make the machine difficult to control. This is due to the surface area in contact with the concrete (the blade set with the greater contact area tends to stick to the concrete more).

Matching Blade Pitch for Both Sets of Blades

Trowels equipped with **Twin Pitch™** Controls may need to have blade pitch between the two sets of blades "syncronized". If the blades need to be syncronized this is easily accomplished by performing the following. Refer to Figure 29.

1. Lift the pitch adjustment handle on either side. Once lifted, that side is now disconnected from the **Twin Pitch™** system.
2. Adjust to match the opposite side.
3. When adjusted, lower the handle to **Twin Pitch™** operating position.



A **Twin Pitch™** disengaged (one side)
B Operating Position

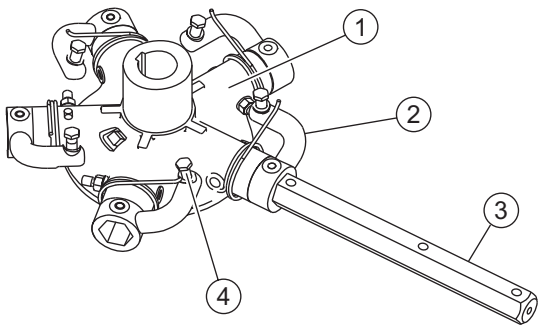
Figure 29. Pitch Towers

Blade Pitch Adjustment Procedure

Maintenance adjustment of blade pitch is made by adjusting a bolt (Figure 30) on the arm of the trowel blade finger. This bolt is the contact point of the trowel arm to the lower wear plate on the thrust collar. The goal of adjustment is to promote consistent blade pitch and finishing quality.

Look for the following indications if blades are wearing unevenly. If so, adjustment may be necessary.

- Is one blade is completely worn out while the others look new?
- Does the machine have a perceptible rolling or bouncing motion when in use?
- Look at the machine while it is running, do the guard rings "rock up and down" relative to the ground?
- Do the pitch control towers rock back and forth?



1 **Spider Plate**
2 **Trowel Lever (Finger)**
3 **Trowel Arm**
4 **Blade Pitch Adjustment Bolt**

Figure 30. Blade Pitch Adjustment Bolt

The easiest and most consistent way to make adjustments on the trowel arm fingers is to use the Trowel Arm Adjustment Fixture (P/N 9177) . It comes with all the hardware necessary to properly accomplish this maintenance and instructions on how to utilize this tool.

If a trowel arm adjustment fixture is not available and immediate adjustment is necessary, temporary field adjustment can be made if you can see or feel which blade is pulling harder by adjusting the bolt that corresponds to that blade.

A better way to determine which blades need adjustment is to place the machine on a known **FLAT** surface (steel metal plate) and pitch the blades as flat as possible. Look at the adjustment bolts. They should all barely make contact with the lower wear plate on the spider. If you can see that one of them is not making contact, some adjustment will be necessary.

Adjust the "high" bolts down to the level of the one that is not touching, or adjust the "low" bolt up to the level of the higher ones. If possible, adjust the low bolt up to the level of the rest of the bolts. This is the fastest way, but may not always work. Verify after adjustment the blades pitch correctly.

Blades that are incorrectly adjusted often will not be able to pitch flat. This can occur if the adjusting bolts are raised too high. Conversely, adjusting bolts that are too low will not allow the blades to be pitched high enough for finishing operations.

If, after making Blade Pitch adjustments the machine is still finishing poorly, blades, trowel arms, and trowel arm bushings may be suspect and should be looked at for adjustment, wear, or damage. See the following sections.

Changing Blades

It is recommended that **ALL** the blades on the entire machine are changed at the same time. If only one or some of the blades are changed, the machine will not finish concrete consistently and the machine may wobble or bounce.

1. Place the machine on a flat, level surface. Adjust the blade pitch control to make the blades as flat as possible. Note the blade orientation on the trowel arm. This is important for ride-on trowels as the two sets of blades counter-rotate. Lift the machine up, placing blocks under the main guard ring to support it.
2. Remove the bolts and lock washers on the trowel arm, and then remove the blade.
3. Scrape all concrete and debris from the trowel arm. This is important to properly seat the new blade.
4. Install the new blade, maintaining the proper orientation for direction of rotation.
5. Reinstall the bolts and lock washers.
6. Repeat steps 2-5 for all remaining blades.

Steering Adjustment

The steering assist adjustment should be performed only by qualified service technicians. For HHN-34TVD steering adjustment instructions, reference MQ Whiteman service bulletin 200925.

Clean-Up

Never allow concrete to harden on the power trowel. Immediately after use wash any concrete off the trowel with water, be careful not to spray a hot engine or muffler. An old paint brush or broom may help loosen any concrete that has started to harden.

Trowel Arm Adjustment

Use the following procedure to check and adjust trowel arms, and check for worn or damaged components when it becomes apparent that the trowel is finishing poorly or in need of routine maintenance.

Look for the following indications. Trowel arm alignment, worn spider bushings or bent trowel arms may the cause.

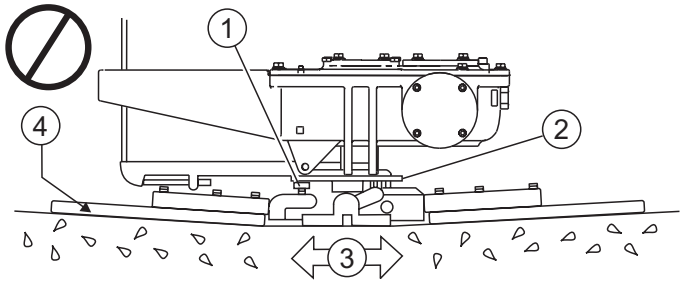
- Are blades wearing unevenly? Is one blade completely worn out while the others look new?
- Does the machine have a perceptible rolling or bouncing motion when in use?
- Look at the machine while it is running; do the guard rings "rock up and down" relative to the ground?

1. Place the trowel in a **FLAT**, **LEVEL** area.

A ***level***, clean area to test the trowel prior to and after is essential. Any unlevel ***spots*** in the floor or debris under the trowel blades will give an incorrect perception of adjustment. Ideally, a 5 x 5 Ft. (1.5 x 1.5 Meter) three-quarter inch (19 mm) thick ***FLAT*** steel plate should be used for testing.

2. Pitch the blades as flat as possible. The ***adjustment bolts*** should all barely make contact with the ***lower wear plate*** on the spider. If one is not making contact, adjustment will be necessary. (Item 1, Figure 31).

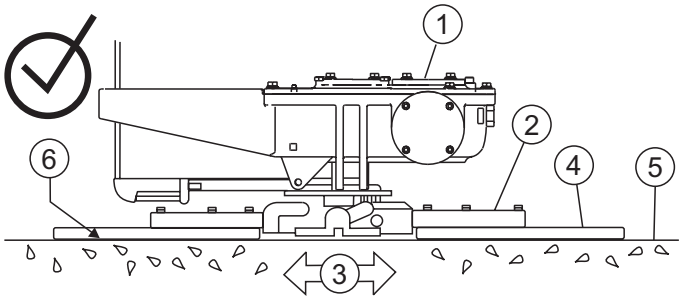
Figure 31 illustrates, "***incorrect alignment", worn spider bushings or bent trowel arms***. Check that the adjustment bolt is barely touching (0.10" max. clearance) lower wear plate. All alignment bolts should be spaced the same distance from the lower wear plate.



1	**Adjustment Bolt**
2	**Lower Wear Plate**
3	**Surface**
4	**"Dished" Effect on Finished Concrete**

Figure 31. Incorrect Spider Plate Alignment

Figure 32 illustrates the "***correct alignment***" for a spider plate (as shipped from the factory).



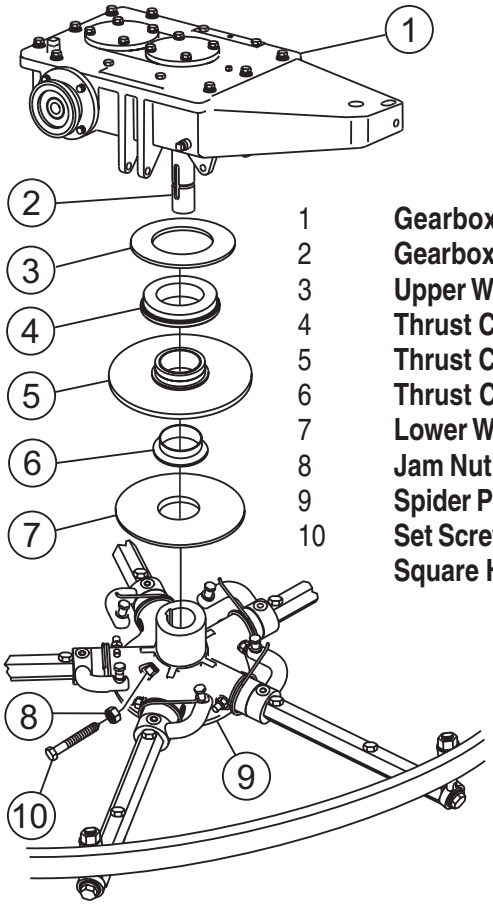
1	**Gearbox**	4	**Mounting Bar**
2	**Trowel Arm**	5	**Blade**
3	**Surface**	6	**Correct Alignment**

Figure 32. Correct Spider Plate Alignment

Spider Removal

Remove the spider assembly from the gearbox shaft as follows:

1. Locate the cone point square head set screw (Figure 33) and attached jam nut found on the side of the spider assembly.



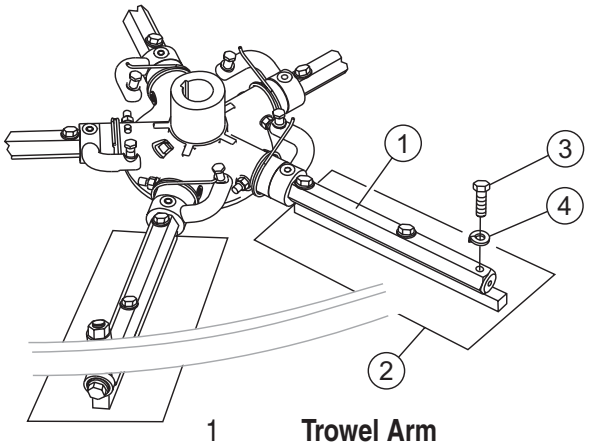
1	**Gearbox**
2	**Gearbox Shaft**
3	**Upper Wear Plate**
4	**Thrust Collar Bearing**
5	**Thrust Collar**
6	**Thrust Collar Bushing**
7	**Lower Wear Plate**
8	**Jam Nut**
9	**Spider Plate**
10	**Set Screw, (Cone Point, Square Head)**

Figure 33. Spider/Gearbox Removal

2. Loosen the jam nut and cone point square head set screw.
3. Carefully lift the ***upper trowel assembly*** off of the spider assembly. A slight tap with a rubber mallet may be necessary to dislodge the spider from the main shaft of the gearbox.

Trowel Blade Removal

Remove the trowel blades by removing the three hex head bolts (Figure 34) from the trowel arm. Set blades aside.



1 **Trowel Arm**
2 **Trowel Blade**
3 **Hex Head Bolt**
4 **Lock Washer**

Figure 34. Trowel Blades

Trowel Arm Removal

1. Remove the hardware securing the stabilizer ring to the trowel arm. (Figure 35)

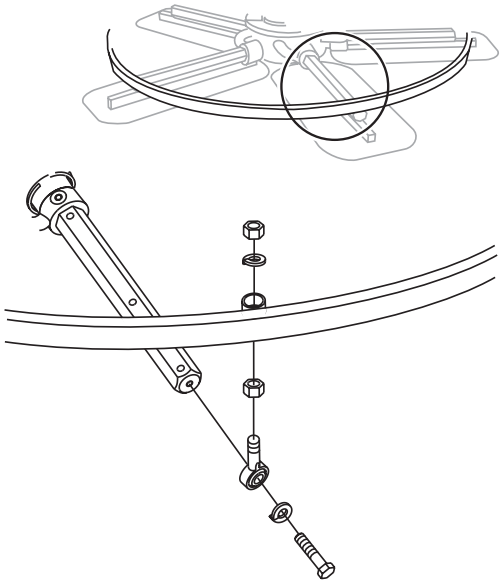
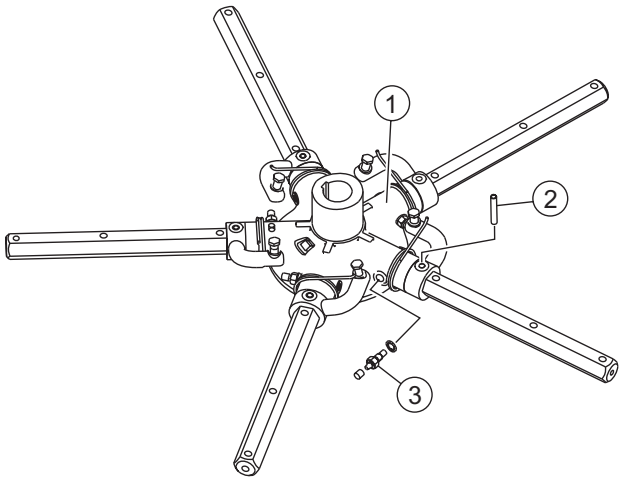


Figure 35. Stabilizer Ring

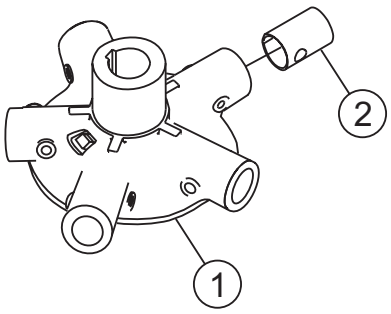
2. Each trowel arm is held in place at the spider plate by a hex head bolt (zerk grease fitting) and a roll pin. Remove both the hex head bolt and the roll pin (Figure 36) from the spider plate.
3. Remove the trowel arm from the spider plate.



1 **Spider Plate**
2 **Roll Pin**
3 **Hex Head Bolt (Zerk Fitting)**

Figure 36. Removing Roll Pin and Zerk Grease Fitting

4. Should the trowel arm inserts (bronze bushing) come out with the trowel arm, remove the bushing from the trowel arm and set aside in a safe place. If the bushing is retained inside the spider plate, carefully remove the bushing.
5. Examine the bronze trowel arm bushing (Figure 37), and clean if necessary. Replace bushing if out-of-round or worn.



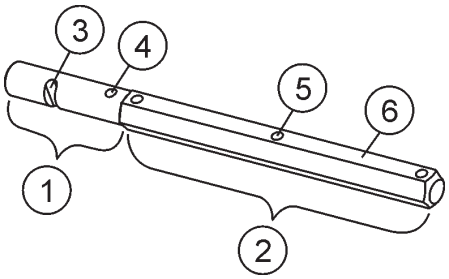
1 **Spider Plate**
2 **Bronze Bushing**

Figure 37. Bronze Bushings

6. ***Wire brush*** any build-up of concrete from all six sides of the trowel arm. Repeat this for the remaining arms.

Checking Trowel Arm Straightness

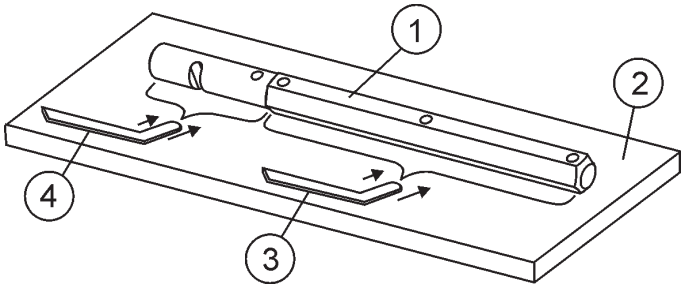
Trowel arms can be damaged by rough handling, (such as dropping the trowel on the pad), or by striking exposed plumbing, forms, or rebar while in operation. A bent trowel arm will not allow the trowel to operate in a smooth fluid rotation. If bent trowel arms are suspect, check for flatness as follows, refer to Figures 38 and 39:



1 **Trowel Arm Round Shaft Section**
2 **Trowel Arm Hexagonal (Hex) Shaft Section**
3 **Lever Mounting Slot (Left Arm Shown)**
4 **Roll Pin Hole**
5 **Blade Attachment Bolt Hole (One of Three)**
6 **Flat of Hexagonal Shaft (Top of Arm)**

Figure 38. Trowel Arm

1. Use a thick steel plate, granite slab or any surface which is ***true*** and ***flat***, to check all ***six sides*** of each trowel arm for flatness.
2. Check each of the six sides of the trowel arm (hex section). A feeler gauge of .004" (0.10 mm) should not pass between the flat of the trowel arm and the test surface along its length on the test surface. (Figure 39 item 3) .



1 **Trowel Arm**
2 **Flat Test Surface**
3 **Feeler Gauge (.004 in. / 0.10 mm)**
4 **Feeler Gauge (.005 in. / 0.127 mm)**

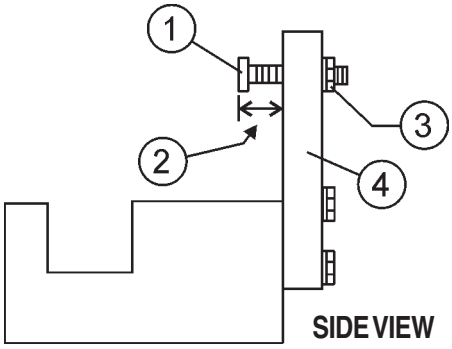
Figure 39. Checking Trowel Arm Flatness

3. Next, check the clearance between the round shaft and the test surface as one of the flat hex sections of the arm rests on the test surface. Rotate the arm to each of the flat hex sections and check the clearance of the round shaft. Use a feeler gauge of .005" (0.127 mm). Each section should have the ***same clearance*** between the round of the trowel arm shaft and the test surface.
4. If the trowel arm is found to be ***uneven*** or ***bent***, replace the trowel arm.

Trowel Arm Adjustment

Shown in (Figure 40) is the adjustment fixture with a trowel arm inserted. As each trowel arm is locked into the fixture, the arm bolt is adjusted to where it contacts a stop on the fixture. This will consistently adjust all of the trowel arms, keeping the finisher as flat and evenly pitched as possible.

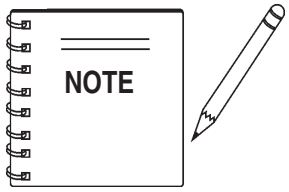
1. Locate the trowel arm adjustment tool P/N 9177.



1 **Adjustment Bolt**
2 **"Distance"**
3 **Locking Nut**
4 **Fixture Arm**

Figure 40. Trowel Arm Adjustment Tool Side View

2. Ensure the fixture arm is in the proper setting (up or down) for your trowel arm rotation as shown in Figure 41.



Arms with CLOCK-WISE blade rotation use the fixture arm in the UP position (A in Figure 41). Arms with COUNTER CLOCK-WISE blade rotation use the fixture with the fixture arm in the DOWN position. (B in Figure 41).

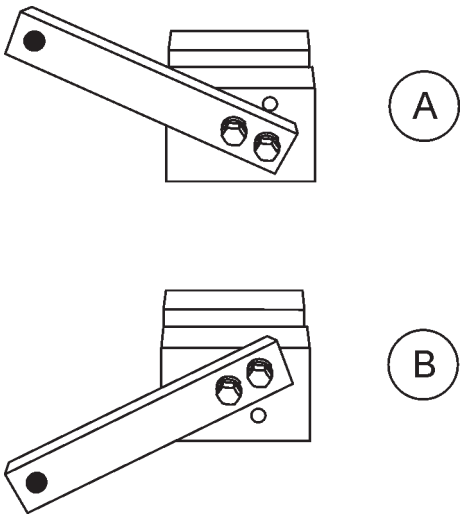
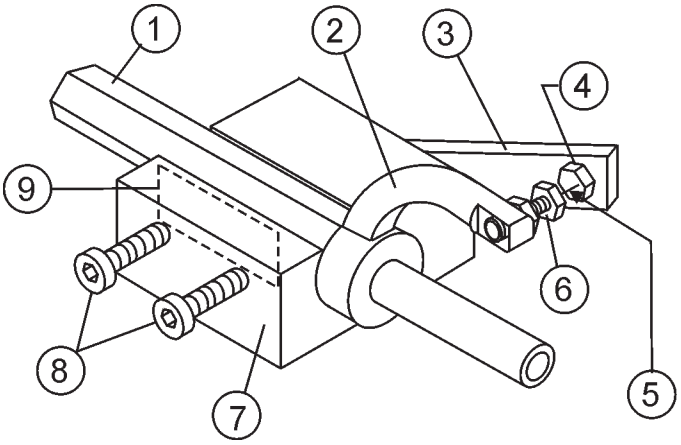


Figure 41. Trowel Arm Adjustment Setup

3. Unscrew the locking bolts on the adjustment tool and place the trowel arm into the fixture channel as shown in Figure 42 A **thin shim** may be required to cover the blade holes on the trowel arm. Make sure to align the **trowel** adjustment bolt with the **fixture** adjustment bolt.



1	**Arm**
2	**Trowel Arm Lever**
3	**Fixture Arm**
4	**Adjustment Bolt**
5	**Distance = .010 Inch**
6	**Adjustment Bolt**
7	**Trowel Arm Adjustment Fixture**
8	**Locking Bolts**
9	**Shim**

Figure 42. Trowel Arm Adjustment Fixture Components

4. Use an allen wrench to tighten the locking bolts securing the trowel arm in place.
5. Adjust the bolt "distance" shown in Figure 42 to match one of the arms. The other arms will be adjusted to match this distance.
6. Loosen the locking nut on the trowel arm lever, then turn the trowel arm adjusting bolt until it barely touches (.010") the fixture adjusting bolt.
7. Once the correct adjustment is made, tighten the lock nut on the trowel arm to lock in place.
8. Loosen locking nuts on the adjustment fixture, and remove trowel arm.
9. Repeat steps for the remaining trowel arms.

Re-Assembly

1. Clean and examine the upper/lower wear plates and thrust collar. Examine the entire spider assembly. Wire brush any concrete or rust build-up. If any of the spider components are found to be damaged or out of round, replace them.
2. Make sure that the bronze trowel arm bushing is not damage or out of round. Clean the bushing if necessary. If the bronze bushing is damaged or worn, replace it.
3. Reinstall bronze bushing onto trowel arm.
4. Repeat steps 2 -3 for each trowel arm.
5. Make sure that the spring tensioner is in the correct position to exert tension on the trowel arm.
6. Insert all trowel arms with levers into spider plate (with bronze bushing already installed) using care to align grease hole on bronze bushing with grease hole fitting on spider plate.
7. Lock trowel arms in place by tightening the hex head bolt with zerk grease fitting and jam nut.
8. Re-install the blades onto the trowel arms.
9. Install stabilizer ring onto spider assembly.
10. Lubricate all grease points (zerk fittings) with premium "***Lithum 12"*** based grease, conforming to NLG1 Grade #2 consistency.

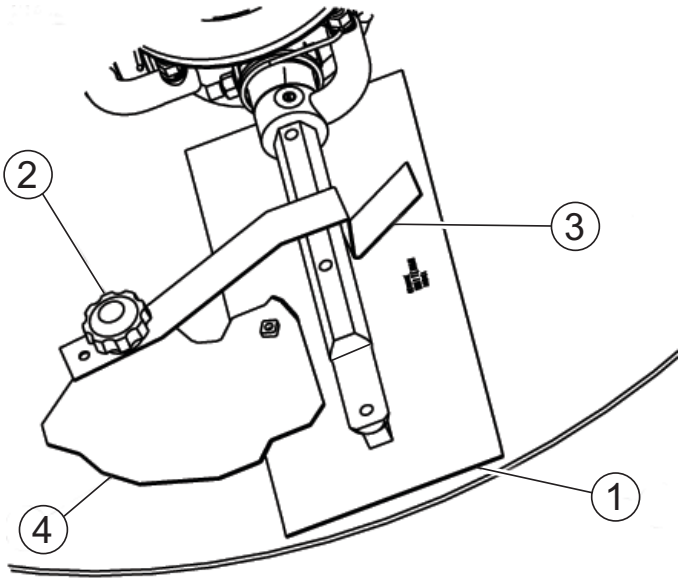
Installing Pans Onto Finisher Blades

These round discs sometimes referred to as "pans" attach to the spiders arms and allow early floating on wet concrete and easy movement from wet to dry areas. They are also very effective in embedding large aggregates and surface hardeners.

WARNING

ALWAYS install pans either on the work area or on an area that is next to and level with the work area. **DO NOT** lift the trowel when the pans are attached.

Refer to Figure 43 when installing pans onto finisher blades.



1. Lift trowel just enough to slide pan under blades. Lower finisher onto pan with blades (item #1) adjacent to Z-Clips (item #4).
2. Rotate blades into position under Z-Clips. Ensure that the blades are rotated in the direction of travel when the machine is in operation or use the engine to rotate the blades into position.
3. Attach the blade tie-downs (item #3) to the far side of the Z-Clip brackets (item #4) with tie-down knobs (item #2) as shown in figure 43.
4. Check to make certain that the blade edges are secured under the Z-Clips and the tie-downs are secured completely over the edges of the blade bar before the machine is put back into operation.

1	**Blade Assembly**
2	**Knob, Tie-Down Z-Clip Pans**
3	**Tie-Down, Blade**
4	**Z-Clip, Pan**

Figure 43. Z-Clip Finisher Pan Installation

Decommissioning Trowel/Components

Decommissioning is a controlled process used to safely retire a piece of equipment that is no longer serviceable. If the equipment poses an unacceptable and unrepairable safety risk due to wear or damage or is no longer cost effective to maintain, (beyond life-cycle reliability) and is to be decommissioned, (demolition and dismantlement), the following procedure must take place:

1. Drain all fluids completely. These may include oil, gasoline, hydraulic oil and antifreeze. Dispose of properly in accordance with local and governmental regulations. Never pour on ground or dump down drains or sewers.
2. Remove battery and bring to appropriate facility for lead reclamation. Use safety precautions when handling batteries that contain sulfuric acid, (See page 14).
3. The remainder can be brought to a salvage yard or metal reclamation facility for further dismantling.

TABLE 5. TROUBLESHOOTING

SYMPTOM	POSSIBLE PROBLEM	SOLUTION
Engine running rough or not at all.	Safety Stop Switch malfunction?	Make sure that the Safety Stop Switch is functioning when the operator is seated; replace switch if necessary.
	Fuel?	Look at the fuel system. Make sure there is fuel being supplied to the engine. Check to ensure that the fuel filter is not clogged.
	Ignition?	Check to ensure that the ignition switch has power and is functioning correctly.
	Other problems?	Consult engine manufacturer's manual.
Safety Stop Switch not functioning.	Loose wire connections?	Check wiring. Replace as necessary.
	Bad contacts?	Replace switch.
If trowel "bounces, rolls concrete, or makes uneven swirls in concrete".	Blades?	Make certain blades are in good condition, not excessively worn. Finish blades should measure no less than 2" (50mm) from the blade bar to the trailing edge, combo blades should measure no less that 3.5" (89mm). Trailing edge of blade should be straight and parallel to the blade bar.
	Spider?	Check that all blades are set at the same pitch angle as measured at the spider. A field adjustment tool is available for height adjustment of the trowel arms (see Optional Equipment).
	Bent trowel arms?	Check the spider assembly for bent trowel arms. If one of the arms is even slightly bent, replace it immediately.
	Trowel arm bushings?	Check the trowel arm bushings for tightness. This can be done by moving the trowel arms up and down. If there is more than 1/8" (3.2 mm) of travel at the tip of the arm, the bushings should be replaced. All bushings should be replaced at the same time.
	Thrust collar?	Check the flatness of the thrust collar by rotating it on the spider. If it varies by more than 0.02" (0.5 mm) replace the thrust collar.
	Thrust collar bushing?	Check the thrust collar by rocking it on the spider. If it can tilt more than 1/16" (1.6 mm) [as measured at the thrust collar O.D.], replace the bushing in the thrust collar.
	Thrust bearing worn?	Check the thrust bearing to see that it is spinning free. Replace if necessary.
	Blade pitch?	Check blades for consistent pitch. Adjust per Maintenance section instructions if necessary.
Machine has a perceptible rolling motion while running.	Main shaft?	The main output shaft of the gearbox assembly should be checked for straightness. The main shaft must run straight and cannot be more than 0.003" (0.08 mm) out of round at the spider attachment point.
	Yoke?	Check to make sure that both fingers of the yoke press evenly on the wear cap. Replace yoke as necessary.

TABLE 5. TROUBLESHOOTING (CONTINUED)		
SYMPTOM	**POSSIBLE PROBLEM**	**SOLUTION**
Lights (optional) not working.	Wiring?	Check all electrical connections, including the master on/off switch and check to see if wiring is in good condition with no shorts. Replace as necessary.
	Lights?	Check to see if light bulbs are still good. Replace if broken.
Retardant spray (optional) not working.	Retardant?	Check the tank to make sure retardant is present. Fill tank as necessary.
	Wiring?	Check all electrical connections, including master on/off switch connections. Replace components and wiring as necessary.
	Bad switch?	Check the continuity of master on/off switch. Replace if broken.
	Bad spray pump?	If pump has a voltage present when the switch is turned on, but does not operate and electrical connections to the pump are good, replace the pump.
Steering effort is too high or unresponsive.	Steering linkages out of adjustment?	Adjust the connectng linkage found at the base of the handle. See "Steering Adjustment Instructions", Service Bulletin 200925.
	Worn components?	Replace all parts that are bent or worn.
	Gearbox pivots?	Check to ensure free movement of gearboxes.
Operating position is uncomfortable.	Seat adjust for operator?	Adjust seat with lever located on the front of the seat.
Control handles are too close together or too far apart.	Steering linkages out of adjustment?	See section on steering adjustment.
	Bent control handles?	Replace all parts that are bent.
Clutch slipping or sluggish response when responding to engine speed.	Belt tension?	Adjust the belt center distance as noted in the drive belt adjustment section.
	Worn belts?	Replace.
	Dirty Clutch?	Disassemble and clean the clutch.
	Worn out Clutch?	Replace shoes on friction clutch. Posi-Grip, replace entire clutch.
	Worn Bearings in gearbox?	Rotate gearbox input shaft by hand. If shaft rotates with difficulty, check the input and output shaft bearings. Replace if necessary.
	Worn or broken gears in gearbox?	Check in particular to verify that the gearbox output shaft rotates when the input shaft is rotated. Replace both the worm gear and worm as a set.
	Worn drive shaft bearings	Inspect driveline bearings, replace if necessary.
Linkage on Twin Pitch (optional) not working.	Crank handles?	Make sure that both crank handles are pushed down as far as possible. Doing this ensures that the linkage is engaged.
	Damaged part?	Replace all damaged parts immediately.
Belts wearing out too fast.	Drive pulley alignment?	Check to see if lower drive pulley is correctly aligned with the clutch.
	Tension?	Check to ensure that the crankshaft to drive line center distance is correct.

NOTE PAGE

PAYMENT TERMS

Terms of payment for parts are net 30 days.

FREIGHT POLICY

All parts orders will be shipped collect or prepaid with the charges added to the invoice. All shipments are F.O.B. point of origin. Multiquip's responsibility ceases when a signed manifest has been obtained from the carrier, and any claim for shortage or damage must be settled between the consignee and the carrier.

MINIMUM ORDER

The minimum charge for orders from Multiquip is $15.00 net. Customers will be asked for instructions regarding handling of orders not meeting this requirement.

RETURNED GOODS POLICY

Return shipments will be accepted and credit will be allowed, subject to the following provisions:

1. A Returned Material Authorization must be approved by Multiquip prior to shipment.
2. To obtain a Return Material Authorization, a list must be provided to Multiquip Parts Sales that defines item numbers, quantities, and descriptions of the items to be returned.
    a. The parts numbers and descriptions must match the current parts price list.
    b. The list must be typed or computer generated.
    c. The list must state the reason(s) for the return.
    d. The list must reference the sales order(s) or invoice(s) under which the items were originally purchased.
    e. The list must include the name and phone number of the person requesting the RMA.
3. A copy of the Return Material Authorization must accompany the return shipment.
4. Freight is at the sender's expense. All parts must be returned freight prepaid to Multiquip's designated receiving point.
5. Parts must be in new and resalable condition, in the original Multiquip package (if any), and with Multiquip part numbers clearly marked.
6. The following items are not returnable:
    a. Obsolete parts. (If an item is in the price book and shows as being replaced by another item, it is obsolete.)
    b. Any parts with a limited shelf life (such as gaskets, seals, "O" rings, and other rubber parts) that were purchased more than six months prior to the return date.
    c. Any line item with an extended dealer net price of less than $5.00.
    d. Special order items.
    e. Electrical components.
    f. Paint, chemicals, and lubricants.
    g. Decals and paper products.
    h. Items purchased in kits.
7. The sender will be notified of any material received that is not acceptable.
8. Such material will be held for five working days from notification, pending instructions. If a reply is not received within five days, the material will be returned to the sender at his expense.
9. Credit on returned parts will be issued at dealer net price at time of the original purchase, less a 15% restocking charge.
10. In cases where an item is accepted, for which the original purchase document can not be determined, the price will be based on the list price that was effective twelve months prior to the RMA date.
11. Credit issued will be applied to future purchases only.

PRICING AND REBATES

Prices are subject to change without prior notice. Price changes are effective on a specific date and all orders received on or after that date will be billed at the revised price. Rebates for price declines and added charges for price increases will not be made for stock on hand at the time of any price change.

Multiquip reserves the right to quote and sell direct to Government agencies, and to Original Equipment Manufacturer accounts who use our products as integral parts of their own products.

SPECIAL EXPEDITING SERVICE

A $35.00 surcharge will be added to the invoice for special handling including bus shipments, insured parcel post or in cases where Multiquip must personally deliver the parts to the carrier.

LIMITATIONS OF SELLER'S LIABILITY

Multiquip shall not be liable hereunder for damages in excess of the purchase price of the item with respect to which damages are claimed, and in no event shall Multiquip be liable for loss of profit or good will or for any other special, consequential or incidental damages.

LIMITATION OF WARRANTIES

No warranties, express or implied, are made in connection with the sale of parts or trade accessories nor as to any engine not manufactured by Multiquip. Such warranties made in connection with the sale of new, complete units are made exclusively by a statement of warranty packaged with such units, and Multiquip neither assumes nor authorizes any person to assume for it any other obligation or liability whatever in connection with the sale of its products. Apart from such written statement of warranty, there are no warranties, express, implied or statutory, which extend beyond the description of the products on the face hereof.

OPERATION MANUAL

HERE'S HOW TO GET HELP

PLEASE HAVE THE MODEL AND SERIAL NUMBER *ON-HAND* WHEN CALLING

UNITED STATES

Multiquip Corporate Office
18910 Wilmington Ave. Tel. (800) 421-1244
Carson, CA 90746 Fax (800) 537-3927
Contact: mq@multiquip.com

Mayco Parts
800-306-2926 Fax: 800-672-7877
310-537-3700 Fax: 310-637-3284

Service Department
800-421-1244 Fax: 310-537-4259
310-537-3700

MQ Parts Department
800-427-1244 Fax: 800-672-7877
310-537-3700 Fax: 310-637-3284

Warranty Department
800-421-1244, Ext. 279 Fax: 310-537-1173
310-537-3700, Ext. 279

Technial Assistance
800-478-1244 Fax: 310-631-5032

MEXICO

MQ Cipsa
Carr. Fed. Mexico-Puebla KM 126.5 Tel. (52) 222-225-9900
Momoxpan, Cholula, Puebla 72760 Mexico Fax (52) 222-285-0420
Contact: pmastretta@cipsa.com.mx

CANADA

Multiquip
4110 Industriel Boul. Tel. (450) 625-2244
Laval, Quebec, Canada H7L 6V3 Fax (450) 625-8664
Contact: jmartin@multiquip.com

UNITED KINGDOM

Multiquip (UK) Limited Head Office
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Ashton-under-Lyne, Fax 0161 339 3226
Lancashire OL7 0TL
Contact: sales@multiquip.co.uk

BRAZIL

Multiquip
Av. Evandro Lins e Silva, 840 - grupo 505 Tel. 011-55-21-3433-9055
Barra de Tijuca - Rio de Janeiro Fax 011-55-21-3433-9055
Contact: cnavarro@multiquip.com.br, srentes@multiquip.com.br

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This manual MUST accompany the equipment at all times. This manual is considered a permanent part of the equipment and should remain with the unit if resold.

The information and specifications included in this publication were in effect at the time of approval for printing. Illustrations are based on the *MQ Whiteman Series HHN-34TVD Ride-On Power Trowel.* Illustrations, descriptions, references and technical data contained in this manual are for guidance only and may not be considered as binding. Multiquip Inc. reserves the right to discontinue or change specifications, design or the information published in this publication at any time without notice and without incurring any obligations.

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